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COLLECTIVE REVIEW

THE CAUSES AND POSSIBLE REDUCTION OF OPERATIVE MORTALITY IN GERIATRIC SURGERY, WITH AN ANALYSIS OF 100 CONSECUTIVE AUTOPSY RECORDS

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"Grow old along with me!
The best is yet to be,
The last of life for which the first was made."
Rabbi Ben Ezra: Browning

WHEN Marcus Tullius Cicero (106–43 B.C.) wrote his delightful and philosophical "De Senectute," he little dreamed that in the middle of the twentieth century the medical profession and an interested public would pool their facilities to help explain the aging process and that they would seek methods to increase longevity and to insure a happier and healthier existence during the declining years. With an inspiring optimism, Cicero relished the activities of old age. He indicated his intolerance of those who grumbled about advancing years when he quoted the venerable Cato as saying in his dialogue with his two younger disciples, Scipio and Laelius, "the very period (old age) which at a distance is every man's warmest wish to attain, no sooner arrives than it is equally the object of his lamentations," and "I know not any season of life that is passed more agreeably than the learned leisure of a virtuous old age." He dismissed the sex problem by quoting the nonagenarian Sophocles, who, when asked if he engaged in amorous commerce with the fair sex, exclaimed, "Heaven forbid! and glad am I to have made my escape from the tyranny of so imperious a passion." He was a firm believer in the immortality of the soul. Among the simple rules that he formulated for the prolongation and enjoyment of life were discretion in eating habits, mental activity, occupation on the soil, and participation in sports. Some of these rules were erroneously arrived at by generalizing from the particular. Surgery was not mentioned. He left that for those who were to follow.

A previous communication (10) reports a statistical analysis of 2,558 collected cases including our series. All of the patients were over the age of 60 and had had major operative procedures, including emergency surgery. They showed a mortality rate of 13.1 per cent. Our own experience in a municipal hospital was based on 450 major surgical operations, 13 per cent of which were of an emergency nature. The over-all mortality was 22.6 per cent in patients who represented an extreme substandard risk. All of these figures are not prohibitive when we consider that the major portion of the patients were cared for in periods when the more recent advances in chemotherapy, diagnostic aids, early ambulation, anesthesia, nutrition, and parenteral and vitamin therapy were not available. In our cases the clinical impression was given that the major causes of operative death within 1 month after operation were heart failure, bronchopneumonia, or both, accompanied by pulmonary edema. This impression was fortified by a review of 55 autopsy records of patients between the seventh and tenth decades. It is the purpose of

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TABLE I.—DEATHS FROM SPECIFIED CAUSES. AGES 60 TO 74 YEARS. METROPOLITAN LIFE INSURANCE COMPANY, WEEKLY PREMIUM-PAYING INDUSTRIAL BUSINESS FOR 1945.

Cause of death	Number of deaths 60–74	Per cent 60–74 of 1–74
All causes—excluding enemy action	55,530	48.1
(Ten leading causes)	48,149	51.6
1. Organic heart disease	15,825	64.3
2. Cancer—all forms	9,533	52.8
3. Diseases of the coronary arteries and angina pectoris	6,036	56.0
4. Cerebral hemorrhage and paralysis without specified cause	5,862	62.7
5. Accidents—all forms	1,710	19.3
6. Tuberculosis—all forms	998	16.5
7. Chronic nephritis	3,380	56.4
8. Influenza and Pneumonia	1,710	41.4
9. Diabetes mellitus	2,564	63.3
10. Cirrhosis of the liver	531	38.3

this article to discuss in more detail a larger number of our autopsy findings, covering the period from 1939 to 1947, as they relate to the causes of operative mortality in geriatric surgery, and also to discuss briefly various possible salient prophylactic measures against such mortality. In making certain observations in this study, it must be recognized that there are some variable and intangible factors in the condition of these patients in the light of which positive conclusions are difficult to establish.

LIFE SPAN AND MORTALITY RATES

The life span is increasing. Extraordinary progress has been made during the past 35 years in conserving life, despite the adverse effects of two world wars and a major economic depression. The expectation of life at birth rose from 46⅔ years in 1911 and 1912 to 65 years in 1945, a gain of 18⅓ years (36). Between the ages of 65 and 74, the decrease in mortality from the years between 1911 and 1915 to those between 1941 and 1945, was 29.1 per cent for white males, 22.9 per cent for colored males, 36.7 per cent for white females, and 25.8 per cent for colored females. It is estimated (37) that those who are 65 years and older will constitute 9.1 per cent of the population in 1960 and 11.6 per cent in 1980. Table I (41) is self-explanatory and demonstrates clearly that the leading causes of death are diseases which attack people of the older age groups. These observations present a challenge which the surgeon must meet by playing an increasingly important role in geriatrics.

OPERATIVE MORTALITY DEFINED

What constitutes an operative mortality? The answer to this question necessarily gives rise to varying opinions. Basically, the time element involved in a death after operative therapy should be the important factor. Balanced against this is life span without operation. It is not justifiable to speak of a mortality 3 months postoperative, if it is estimated that the patient with diminished homeostasis would have lived no longer nor less than 3 months without operation. For practical purposes, it has been our custom to speak of operative mortalities in the aged if they occur within 1 month after operation. Generally, during this period, the patient feels the maximum effect of a technical procedure and it is at this time that the surgeon uses his greatest effort to tide him over. He either wins or loses.

THE CAUSES OF OPERATIVE MORTALITY

It is fair to state that in our hospital, as in other hospitals, efficiency was diminished during the war years because of insufficient and, at times, inexperienced personnel to carry out routine procedures. The shortage of physicians, nurses, attendants, and laboratory workers caused curtailment in service and inadequate observation for the records. The increased and multiple demands on those on the home front necessarily resulted in less supervision by those in senior positions. It may be assumed these conditions had some bearing on adverse mortality rates during this period.

Systemic pathological changes in the aged are usually so varied and marked that unless there is an obvious cause of death, it may be difficult, even after autopsy, to state the principal cause of operative death, i.e., the lesion which has killed the patient. Concomitant disease of the heart, blood vessels, kidneys, lung, liver, or brain, with accompanying metabolic disturbance may confuse the pathological picture to such an extent that it is almost impossible to attribute the cause of operative death to a specific pathological diagnosis. The problem is simplified if there is evidence of an acute myocardial infarction, cerebral hemorrhage, miliary tuberculosis, severe bilateral pyelonephritis, multiple liver abscesses, pancreatic necrosis, general peritonitis, or carcinoma with multiple metastases. Too frequently autopsy protocols show a long list of pathological findings which the most expert pathologist may find difficult to evaluate in terms of the principal cause of death. Therefore, after a mortality conference in which there is an exhibition of organs and tissue sections from autopsy material, the clinician may be left in the dark concerning the principal cause of

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death. The contributing causes are usually more evident. One patient had a celiotomy, in the course of which an inoperable carcinoma of the stomach was found. Two days later he died and autopsy also showed a diffuse bilateral bronchopneumonia. Did the carcinoma or the pneumonia kill him? In order to avoid academic discussion, we have inclined to the belief that he would have lived longer without operation and that the bronchopneumonia was the primary cause of death.

A correlation of clinical impressions and autopsy findings in the older age groups has clearly demonstrated that death has too often resulted from unsuspected pathologic conditions which are in no way related to the condition for which the patient had surgical therapy. Chief among these are pneumonia, cardiac dilatation, gastric and intestinal dilatation, thrombosis, and infection in vital organs.

In order to minimize the possibilities of error in determining the cause of operative death because of the clinical findings, 100 consecutive autopsy protocols of patients above the age of 60 who died within 1 month after operation were analyzed. The results of the analysis have been striking and instructive. The contributing causes of death common to all the records were varying degrees of arteriosclerosis, valvular defects, coronary sclerosis, and myocardial, renal, and liver damage. These contributing factors cannot be underestimated, since any one of them or any combination may be sufficient cause to help unbalance the scales against a patient whose homeostasis is already delicate and whose margin of safety is hazardous. It is in this respect especially that there is such a marked difference between the young and old in tolerance to operative therapy. There were 66 males and 34 females who were subjected to autopsy. The oldest patient was 91 years of age. The average age was 72 years for both sexes. Table II shows the distribution of autopsies by systems or organs together with the principal and contributory causes of death. Table III gives an analysis of the causes of death. Instructive observations from these autopsies will be incorporated in various pertinent sections of this article. Other observations can be briefly summarized as follows:

Bronchopneumonia and heart failure with accompanying pulmonary edema equally caused a little more than half of the total deaths.

Deaths following gastrointestinal operations were caused in most instances by peritonitis, the result of existing perforation at the time of operation or subsequent leakage of the suture lines. Palliative gastroenterostomy for carcinoma of the stomach would better have been done as far away from the neoplasm as possible and preferably with a Murphy button. Suture lines are then unnecessary and greater operative speed lessens the chance of cardiopulmonary death. Two patients with carcinoma of the colon came to operation too late. They had obstruction, perforation with peritonitis, and general metastases. Peritoneal metastases predisposed to peritonitis, even when only an exploratory celiotomy was performed. All the cases of intestinal obstruction were unduely delayed for operative therapy. The patients were vulnerable to mesenteric vessel damage, gangrene of the bowel, and peritonitis.

Acute abdominal conditions in the aged are frequently difficult to diagnose. One patient had an appendectomy in the presence of a diverticulitis of the sigmoid.

Among the 20 patients who had operations on the genitourinary tract, there were 13 with pyelonephritis. Eight in this group succumbed. The remainder died of cardiopulmonary complications which included bronchopneumonia and occlusion of the coronary artery.

The major cause of death in operations for biliary tract disease was bronchopneumonia. Two patients died of occlusion of the coronary artery. One of these should not have been subjected to operation because of a recent coronary attack. He died during the induction of anesthesia. One patient died of gastrointestinal hemorrhage. In this instance common duct obstruction with jaundice was too prolonged.

Patients with midthigh amputations for arteriosclerotic gangrene died mostly from massive thrombosis in the intra-abdominal or intrathoracic vessels, whereas amputees for diabetic gangrene died of systemic complications such as bronchopneumonia, sepsis, or pulmonary edema.

Bronchopneumonia or embolism took its toll of those who had operative fixation for fracture of the neck of the femur.

Sepsis predominated as a cause of death in pyarthrosis.

Among the contributory causes of death, unsuspected pyelonephritis, metastatic carcinoma, bronchopneumonia, coronary occlusion, and pulmonary tuberculosis were impressive.

Emergency surgery. Condict W. Cutler, Jr., presented a paper from our service before The American Surgical Association in March, 1947 on his observations in 188 consecutive emergency procedures of many types in people over the age of 60 (average age 74). The mortality rate was 44 per cent. These cases occurred between the years 1939 and 1946 and represented patients who were

TABLE II.—ANALYSIS OF 100 CONSECUTIVE AUTOPSY PROTOCOLS IN PATIENTS OVER 60 YEARS OF ALL THE PROTOCOLS WERE VARYING DEGREES OF ARTERIOSCLEROSIS, VALVULAR DEFECTS,

Distribution of lesions in gastrointestinal

Group	Diagnosis	Male	Female	Total	OPERATION			
					Radical	No.	Palliative	No.
I	Carcinoma of the esophagus	1	—	1	Resection	1		
II	Carcinoma of the stomach	3	3	6	Gastroenterostomy	3	Exploratory celiotomy	2
					Suture of perforation	1		
III	Carcinoma of the splenic flexure	1	1	2			Colostomy	2
IV	Carcinoma of the rectosigmoid	2	1	3	Cecostomy and abdomino-perineal resection	1	Colostomy	2
V	Carcinoma of ovary	—	1	1			Ileostomy	1
VI	Intestinal obstruction	5	5	10	Ileocecal resection	1	Exploratory celiotomy	3
					Reduction of volvulus	3	Enterostomy	1
					Ventral hernioplasty	1		
					Division of adhesions	1		
VII	Diverticulitis of the colon	2	—	2			Exploratory celiotomy	1
							Appendectomy	1
VIII	Gastric ulcer	1	1	2	Gastroenterostomy	1	Exploratory celiotomy	1
IX	Appendicitis	1	1	2	Appendicectomy	1	Colostomy	1
X	Foreign body perforation of ileum	1	—	1			Cecostomy	1
XI	Cellulitis of floor of mouth	1	—	1	Incision and drainage	1		
	Total	18	13	31		15		16

Distribution of lesions in extremities

I	Arteriosclerotic gangrene	6	1	7	Midthigh amputation	7		

AGE, WHO DIED WITHIN 1 MONTH AFTER OPERATION. THE FINDINGS COMMON TO PRACTICALLY CORONARY SCLEROSIS, AND MYOCARDIAL, RENAL, AND LIVER DAMAGE.

tract and causes of death in 31 patients

CAUSES OF DEATH												
Principal Cause of Death						Contributory Cause of Death					
Cardiac dilatation, Pulmonary edema, pleural effusion	1											
Bronchopneumonia	1	Peritonitis	3	Popliteal venous thrombosis	1	Broncho-pneumonia	2			Metastases	4
Cardiac dilatation, pulmonary edema	1											
		Peritonitis	2			Broncho-pneumonia	1			Metastases	1
Pulmonary artery thrombosis and bronchopneumonia	1	Peritonitis	1					Femoroiliac thrombosis	1	Metastases	1
Bronchopneumonia and lung abscess, cardiac dilatation, pulmonary edema	1											
Cardiac dilatation, pulmonary edema	1									Metastases	1
Lung abscess, bronchiectasis	1	Peritonitis	4	Ileus	1	Broncho-pneumonia	2	Pyelonephritis	1		
Bronchopneumonia, pulmonary edema	1										
Cardiac dilatation, pulmonary edema, broncho-pneumonia	1										
Aspiration pneumonia	1										
Pulmonary edema	1										
		Peritonitis	2			Broncho-pneumonia	1	Pyelonephritis	1		
		Peritonitis	2								
		Peritonitis	2							Carcinoma of sigmoid	1
		Peritonitis	1								
Pulmonary edema	1							Sepsis	1		
	12		17		2						

and causes of death in 23 patients

Cardiac dilatation,	1	Cardiac dilatation, sepsis	1	Mesenteric thrombosis	1	Broncho-pneumonia	1	Gangrenous cystitis, gangrene of stump	1	Contralateral gangrene of foot	1
Bronchopneumonia, pericarditis	1			Pulmonary artery thrombosis	1			Gangrenous cystitis	1	Carcinoma of stomach, pulmonary tuberculosis	1
				Abdominal aorta, thrombosis	1						
				Arteriosclerotic ulcer of stomach with hemorrhage	1						

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Distribution of lesions in extremities

Group	Diagnosis	Male	Female	Total	OPERATION			
					Radical	No.	Palliative	No.
II	Diabetic gangrene	3	1	4	Midthigh amputation	4		
III	Fracture of the neck of the femur	3	1	4	Hip pinning	4		
IV	Decubitus ulcer of the leg	1	—	1	Midthigh amputation	1		
V	Pyarthrosis of a) ankle b) elbow c) hip	— 1 —	1 1 1	1 2 1	Midthigh amputation	1	Incision and drainage No operation	2 1
VI	Varicose veins	—	2	2			Débridement of varicose ulcers Ligation of saphenous vein	1 1
VII	Thrombosis of femoral artery	—	1	1	Embolectomy unsuccessful	1		
	Total	14	9	23		18		5

Distribution of lesions in genito-urinary tract

I	Benign hypertrophy of prostate	12	—	12	One stage suprapubic prostatectomy	5	Suprapubic cystostomy Transurethral resection	15 2
II	Carcinoma of prostate	4	—	4	Perineal prostatectomy	2	Suprapubic cystostomy	2

AGE, WHO DIED WITHIN 1 MONTH AFTER OPERATION. THE FINDINGS COMMON TO PRACTICALLY CORONARY SCLEROSIS, AND MYOCARDIAL, RENAL, AND LIVER DAMAGE.—Continued

and causes of death in 23 patients—Continued

CAUSES OF DEATH											
Principal Cause of Death						Contributory Cause of Death					
Bronchopneumonia	2	Sepsis	1					Subacute pyelitis	1	Pulmonary tuberculosis	1
		Pulmonary edema, diabetic coma	1							Ulcerative esophagitis	1
										Multiple decubiti	1
										Nephrosclerosis	1
Broncho-pneumonia	1	Cerebellar infarct, renal abscess	1			Cardiac mural thrombus	1			Decubitus ulcer	2
Bronchopneumonia, pulmonary edema	1										
Broncho-pneumonia, pulmonary edema, hydrothorax	1										
Bronchopneumonia, pulmonary abscess, empyema	1					Cardiac dilatation	1				
Broncho-pneumonia	1	Sepsis	2			Broncho-pneumonia	1	Acute pyelonephritis	1	Pulmonary tuberculosis	1
Anesthesia death, Cardiac dilatation, pulmonary edema	1									Decubitus ulcer	1
										Decubitus ulcer, pemphigus vulgaris	1
Wound suppuration, pulmonary edema	1	Sepsis, diabetes	1					Pyelonephritis, uremia, gangrenous cystitis	1	Retroperitoneal lymphosarcoma	1
				Saddle thrombus of aorta	1	Acute coronary closure, broncho-pneumonia	1				
	11		7		5						

and causes of death in 20 patients

Pulmonary edema	1	Not determined	1	Gangrenous cystitis	1	Cardiac dilatation, pulmonary edema	1			Pyelitis	1
Cardiac dilatation, pulmonary edema	1			Bilateral pyelonephritis	1	Coronary occlusion	1			Acute pyelonephritis	1
Bronchopneumonia, pulmonary edema	1			Pyelonephritis, uremia	3	Pulmonary congestion	1				
Broncho-pneumonia, lung abscess	1					Bronchiectasis, empyema	1				
Bronchopneumonia, coronary occlusion	1										
Bronchopneumonia, pulmonary edema, cardiac dilatation	1										
Broncho-pneumonia	3							Pulmonary metastases	1	Pyelonephritis	1
Cardiac dilatation, pulmonary edema	1										

TABLE II.—ANALYSIS OF 100 CONSECUTIVE AUTOPSY PROTOCOLS IN PATIENTS OVER 60 YEARS OF ALL THE PROTOCOLS WERE VARYING DEGREES OF ARTERIOSCLEROSIS, VALVULAR DEFECTS,

Distribution of lesions in genito-urinary tract

Group	Diagnosis	Male	Female	Total	OPERATION			
					Radical	No.	Palliative	No.
III	Vesical fistula	1	—	1			Suprapubic cystostomy	1
IV	Hydronephrosis	1	—	1	Nephrectomy	1		
V	Renal calculus and diabetes	1	—	1	Nephrolithotomy	1		
VI	Prostatic abscess	1	—	1			Incision and drainage	1
	Total	20		20		9		11

Distribution of lesions in biliary tract

I	Chronic and acute cholecystitis and cholelithiasis	5	8	13	Cholecystectomy, choledochotomy	4	Cholecystostomy	4
					Cholecystectomy	4	No operation	1
II	Carcinoma of gall bladder and cholelithiasis	—	1	1	Cholecystectomy	1		
	Total	5	9	14		9		5

Distribution of lesions and causes of

THORACIC								
I	Empyema	2	—	2	Thoracotomy and drainage	2		
II	Carcinoma of the larynx	1	—	1			Tracheotomy	1
NEUROLOGICAL								
I	Spinal cord tumor	1	2	3	Laminectomy	3		
II	Fracture of skull with subdural hematoma	—	1	1	Bone-flap evacuation of hematoma	1		
PANCREAS								
I	Carcinoma of head of pancreas	3	—	3			Cholecystostomy	2
							Cholecystgastrostomy	1

AGE, WHO DIED WITHIN 1 MONTH AFTER OPERATION. THE FINDINGS COMMON TO PRACTICALLY CORONARY SCLEROSIS, AND MYOCARDIAL, RENAL, AND LIVER DAMAGE.—Continued

and causes of death in 20 patients—Continued

CAUSES OF DEATH

Principal Cause of Death						Contributory Cause of Death					
Bronchopneumonia, pericarditis	1					Infarct of kidney, spleen, and lungs	1			Pyelonephritis	1
Cardiac dilatation, pulmonary edema	1							Liver metastases from hypernephroma	1		
Aspiration pneumonia	1					Acute toxic hepatitis	1			Acute pyelonephritis	1
Pulmonary edema, coronary occlusion, bronchopneumonia	1					Endocarditis, sepsis	1			Pyelonephritis	1
	14		1		5						

and causes of death in 14 patients

Bronchopneumonia	5	Wound disruption, peritonitis, cardiac dilatation, pulmonary edema	1	Anesthesia death (Acute coronary occlusion)	1	Coronary occlusion (preoperative)	1	Bile peritonitis	1	Pyelonephritis	1
Bronchopneumonia, pulmonary embolism	1	Intestinal hemorrhage,	1					Peritonitis	1	Pericarditis	1
Bronchopneumonia, cardiac dilatation	1	Gas bacillus sepsis pulmonary edema	1					Cholangitis	1	Acute cystitis, chronic pyelonephritis	1
Bronchopneumonia, pulmonary edema, terminal endocarditis	1	Miliary tuberculosis	1					Hydrothorax	1	Chronic pyelonephritis	1
Cardiac dilatation	1										
Bronchopneumonia, pulmonary edema	1							Hydrothorax	1		
	10		3		1						

death in 12 miscellaneous patients

Bronchopneumonia	1	Pulmonary vein thrombosis	1			Carcinoma of bronchus, suppurative bronchiectasis, bronchopneumonia	1			Chronic cystitis	1
Aspiration pneumonia	1										

Bronchopneumonia	1							Extradural arachnoid cyst	1	Metastatic carcinoma of vertebral column and mediastinum	1
Cardiac dilatation, pulmonary edema, liver abscess	1										
Carcinoma of bronchus	1										
Cerebral compression by hematoma	1					Pulmonary edema	1				

Carcinoma of pancreas	1	Metastases to liver	1					Chronic pericarditis, liver abscess	1		
Aspiration pneumonia, pulmonary edema	1										

TABLE II.—ANALYSIS OF 100 CONSECUTIVE AUTOPSY PROTOCOLS IN PATIENTS OVER 60 YEARS OF ALL THE PROTOCOLS WERE VARYING DEGREES OF ARTERIOSCLEROSIS, VALVULAR DEFECTS,

Distribution of lesions and causes of

Group	Diagnosis	Male	Female	Total	OPERATION			
					Radical	No.	Palliative	No.
HERNIA								
I	Sliding inguinal hernia	2	—	2	Hernia Repair	2		
	Total	9	3	12		8		4
	TOTAL PATIENTS	66	34	100	RADICAL	59	PALLIATIVE	41

extremely bad risks, old and senile, poverty stricken, afflicted with chronic and degenerative disease, and those with nutritional deficiencies. Most of these patients would have succumbed without operation and this was their only chance for survival. Frequently, before admission to the surgical service, there was procrastination and an attempt at conservative treatment, so that the surgical risk was increased in many patients. There were a number of understandable reasons for the delay in seeking surgical help in some of the cases. Because of many medical complications, the clinical picture might have been confusing, so that a rapid and accurate diagnosis became difficult in the presence of a surgical emergency. The impact of such an emergency frequently caused a rapid deterioration of these very sick people in a very few hours, so that when they reached the surgeon their condition was desperate. Further, there is a natural inclination on the part of the physician to delay an operative procedure in old, sick, and feeble patients until it becomes inescapable. In order to hasten the prospects for operative relief, additional delay for ideal preoperative preparation was at times precluded, especially in intestinal obstruction, biliary tract disease, and spreading infection or gangrene.

A comparison of the relative mortalities in emergency and nonemergency operations showed that the expected mortality rate will be about two and one-fourth times greater in emergency than in nonemergency procedures. This figure was arrived at by comparing the 44 per cent mortality in emergency operations mentioned with the 19.4 per cent mortality in nonemergency operations, which were calculated from the statistics from our service mentioned in paragraph two.

Shock. Frequently operative mortality which has been ascribed to shock is caused by fundamental pathologic lesions which cannot be seen without autopsy. A discussion of the irreversible shock syndrome as a cause of mortality is purposely avoided because, after an analysis of the autopsy protocols, pathological diagnoses were noted which could adequately explain death. This does not mean that the complex mechanism of shock does not contribute to such exitus, especially when there are damaged vital organs, chiefly the kidney and liver.

PREOPERATIVE PROPHYLAXIS AGAINST MORTALITY

Establishment of diagnosis. Inasmuch as physiological reserve in the aged is diminished, it is extremely important to establish a reasonably certain diagnosis before therapy is attempted. The planning of a surgical procedure then becomes more accurate so that the patient receives the indicated preoperative preparation and is spared the trials of technical fumbling, unnecessary surgical trauma, incorrect or multiple incisions, and lengthy or exploratory operations. Older people do not stand these as well as those who are younger.

The role of heat and humidity. The surgical risk in the aged is increased when there is operative intervention on hot and humid days. McConnell *et al.* concluded that saturated still air at 90°F. is the upper limit of the environment in which man is able to maintain heat equilibrium. The proper dissipation of heat in patients who undergo major surgery is essential. This is true especially in those who live in a temperate climate and who, because of their basic metabolism, may be peculiarly sensitive to heat and humidity. The ability to control normal body temperature has been found deficient in those with disease of the nervous system (19). Leucocytes are increased in those who have prolonged exposure to high temperature, and it is possible that an exhaustion of this defense mechanism might result (19). The syndrome recognized as "postoperative heat stroke" can be avoided if elective procedures are postponed from a hot to a cooler day and if the blood chloride and fluid loss following excessive perspiration are controlled by appropriate measures.

AGE, WHO DIED WITHIN 1 MONTH AFTER OPERATION. THE FINDINGS COMMON TO PRACTICALLY CORONARY SCLEROSIS, AND MYOCARDIAL, RENAL, AND LIVER DAMAGE.—Continued

death in 12 miscellaneous patients

CAUSES OF DEATH											
Principal Cause of Death						Contributory Cause of Death					
		Intestinal obstruction	1	Glioblastoma multiforme	1	Cardiac dilatation	1	Hemiplegia	1	Cystitis, decubitus ulcer	1
	8		3		1						
	55		31		14						

It is an interesting observation that efficiency among operating room personnel is reduced in very hot weather (20). In many hospitals this problem has been solved by the installation of air-conditioned operating rooms. Dry bulb temperatures from 72 to 80°F. and a relative humidity, from 55 to 60 per cent, help to prevent exhaustion of the patient and to furnish comfort for operating room personnel (18).

Chemical balance. The best chance for successful surgical therapy occurs when homeostasis is increased by aiding assimilation, elimination, and the fluid, electrolyte (Moyer), and protein balance, also by medication to improve organic medical conditions. In many instances physiological processes are badly impaired because the human machinery has begun to run down. Despite the most heroic efforts with supportive therapy, the patient goes into a gradual decline and "peters out."

The aged are frequently debilitated and dehydrated from disease, from neglect, from a resistive attitude toward eating, or by the selection of a self-imposed diet which is usually poor in proteins, vitamins, and minerals. The general apathy of sick old people toward taking fluids may confront the surgeon with the problem of acute or chronic water deficit. The accompanying salt retention, dry tongue, anorexia, temperature, and diminished and concentrated urine can be overcome by preliminary intravenous therapy with from 5 to 20 per cent glucose in water and by a planned program in which patients drink at regular intervals under the eyes of the nursing staff. Missing or bad teeth, ill fitting or pain producing dentures, and receding gums play their destructive role to produce insufficient food intake and improper preliminary digestion. Under such circumstances the serving of cooked ground meat is very helpful. An optimistic, explanatory, and positive bed-side approach with regard to the importance of a well balanced diet may very often be sufficient to correct chemical imbalance. It is one thing to order such a diet; it is another to see that the patient takes it. If he does not, he literally becomes autocannibalistic. The establishment of a positive nitrogen balance is necessary, since proteins help to control and stabilize the distribution of body fluids by their chemical and osmotic potential. Proteins also aid in antibody formation (Cannon *et al.*) and they are present in the red blood cells, enzymes, and hormones. They also form a vehicle for calcium in the circulating blood and they act as a spark for vitamin effect. A negative nitrogen balance may result from inadequate ingestion, from diminished assimilation of proteins, from increased body breakdown of proteins, or from the impaired synthesis of amino acids by the liver. The total plasma proteins vary from 6 to 8 grams per 100 cubic centimeters and they consist of plasma albumin (4 to 5.5 grams per 100 cubic centimeters), alpha, beta, and gamma globulins (1.5 to 3 grams per 100 cubic centimeters), and fibrinogen. Plasma albumin content is affected most quickly in hypoproteinemia and, according to Sachar *et al.*, a reduction of 1 gm. in the total plasma albumin indicates a loss of 30 grams of body protein. When the plasma protein reaches the critical level of 5.5 per cent, edema is likely to appear, and when it falls below 3 per cent, the prognosis is grave. A depletion of protein reserve accompanied by dehydration may be masked by a high protein level in concentrated blood. It has been shown by Koop *et al.* (22) that patients who are force-fed with a high nitrogen diet for 5 days before operation maintain a high nitrogen retention. The clinical impression that they were in better condition than a control group was supported by tests for physical fitness with the ballistocardiograph and the tilt-table test. Remington *et al.* have discussed the nutritional rehabilitation of surgical patients and the importance of a positive nitrogen balance to minimize the hazards of disruption of wounds, infection, and necrosis in such viscera as the liver.

There are a number of standard accessory therapies with necessary variations, which depend upon the clinical condition and chemical status of the patient. Among these are infusions with blood or its substitutes, with amino acids, or with glucose and saline solution. In addition, there are available nasal tube feeding, and oral feeding of palatable chocolate-flavored amino acids, hydrolysates, skimmed milk powder (Varco), vitamins, liver extract, or folic acid when indicated.

The control of diabetes. The question of the control of sugar metabolism in surgical diabetics is answered by two schools of thought. One school permits diabetic patients to "spill over" 50 grams or more of glucose in the urine daily, provided that enough protamine insulin is used to maintain good nutrition and to prevent ketosis and/or such clinical symptoms of diabetes as polyuria and thirst. The other school uses every available method to control the diabetes so that the blood sugar approaches normalcy. In diabetes there is a greater incidence of degenerative diseases, infection, gangrene, poor wound healing, and acidosis. A controlled diet and the use of insulin, therefore, are indicated to help tide over the surgical diabetic and spare him a continued hyperglycemia with its harmful end-results. There is one contraindication to this program. Some diabetic patients react to a sudden lowering of the blood sugar to a comparatively normal figure by attacks of angina pectoris which are precipitated by coronary artery spasm or coronary artery occlusion. Generally speaking, however, the use of insulin, glucose, water, and salt are enough to glycogenize and hydrate the patient.

Cardiac status: presbycardia and digitalis therapy. All the autopsies indicated that there were varying degrees of cardiac valvular defects and/or valvulitis with cardiac dilatation or hypertrophy. There were also constant findings of varying degrees of coronary sclerosis with myocardial fibrosis, and often old, and infrequently (5 per cent) recent, myocardial infarcts. These observations and electrocardiographic and physical findings confirmed the fact that the myocardium in the aged is weakened and its reserve is impaired. It is therefore to be expected, as pointed out by Dry, that the mechanisms of cardiac deaths are likely to be congestive heart failure from exhaustion of the cardiac reserve, sudden coronary occlusion, ventricular dysfunction as a result of interference with the conduction system, peripheral circulatory collapse, or massive pulmonary embolism. A note of optimism was sounded by Ochsner when he said, "I think that it would be unfortunate should surgeons receive the impression that patients suffering from heart disease are especially safe. I believe that they are safe because they are considered especially unsafe."

When a prospective life-saving operation is necessary, angina pectoris of organic origin does not contraindicate a technical procedure. The almost universal presence of coronary artery disease in our autopsy findings and the small incidence of acute coronary artery occlusion seem to support this statement. Other investigators have come to the same conclusion. Blumgart *et al.* reported that there were no operative deaths in 25 patients who had complete ablation of the thyroid gland for angina pectoris. Brumm *et al.* found that of 257 patients who had coronary artery disease and who underwent major surgical procedures, 22 had healed myocardial infarcts and the remainder had angina pectoris. Only 4.3 per cent of this group had cardiac deaths and 7 of the 11 deaths could be attributed to coronary thrombosis. Master and his coworkers studied a total of 625 attacks of coronary artery occlusion which were substantiated by autopsy and/or clinical and electrocardiographic findings. Two-thirds of the patients were past the age of 60 and 5.6 per cent of the total number had the coronary occlusion within 3 weeks after an operation. It is possible that some of these patients might have had attacks without an operation, since they all had disease of the coronary artery.

When the beneficial effects of digitalis on a weakened and dilated heart are considered, the direct action on the muscle usually takes precedence over the inhibitory action on the vagus, so that the relaxation of the ventricle during diastole is less than before the administration of the drug. The various heart irregularities, whatever their causes, are usually controlled by digitalis. In view of these facts, it has become our practice to prepare elderly patients for operation by digitalization, unless there is some contraindication to its use, such as heart block. There are some who differ with this concept, especially those who fear the thromboplastic properties of digitalis, which have been shown experimentally and clinically by Macht and by Massie *et al.* However, an increased cardiac reserve not only minimizes the chances of heart failure, but helps to prevent stasis in the pulmonary circuit. Stasis ordinarily predisposes to pulmonary congestion and offers a locus minoris resistentiae for pneumonia and pulmonary edema. Indeed, most terminal pneumonias may be ascribed to this mechanism.

Embarrassment of the circulatory system by overloading it with fluids and by increased intra-abdominal pressure with its harmful effect on

cardiac action are to be avoided. Generally, subdued activity out of bed several days prior to operation may diminish slowing of the blood stream and consequent predisposition to thrombosis.

Chemotherapy. It is generally conceded that the control of intercurrent infections has reduced the morbidity and mortality of the degenerative diseases which accompany the aging process. The least toxic of the antibiotic agents is penicillin and this is tolerated particularly well by the aged. Injudicious use of penicillin has been severely criticized. However, pneumonia, pyelonephritis, and secondary infection are so commonly present as postoperative complications with their concurrent deleterious effects on the blood-forming organs that the routine prophylactic preoperative use of penicillin for 48 hours before major geriatric surgery seems justifiable, even in cases which have no obvious infection. The same program is continued for 48 hours after operation.

In preparation for operations on the intestinal tract, the comparative elimination of pathogenic bacteria in the intestinal flora by streptomycin and by sulfonamides such as sulfathalidine and succinylsulfathiazole has done much to minimize infection and peritonitis, in spite of putrefaction promoted by a high protein diet. The classical methods of minimizing such putrefaction should not be overlooked, namely, bowel cleansing by saline cathartics and by enemas or colon irrigations.

Psychological approach. The elderly patient frequently has fixed ideas about the living, the dead, and the future. He may accept an imminent surgical experience with a calm and fatalistic philosophy. On the other hand, he may be negativistic and resistive, with resulting lack of co-operation. It is this kind of patient who is ready to give up and "lay down and die." He must therefore be conditioned to a more hopeful outlook by a radiant, confident, and optimistic bedside approach and by the demonstration of a keen interest in his welfare. The surgeon can resort to harmless compromises and judicious, constructive flattery. Interviews with ministers in the various religious groups have proved their value in preoperative mental conditioning.

Timing of operation. The clinical eye and surgical judgment must decide the timing and the amount of operative therapy. Conservatism at the wrong time, such as procrastination or operative therapy which is too late, may be one of the greatest causes of operative death. This is especially applicable to infections, gangrene, malignancy, and the obstruction in various systems. Prolonged "work-ups" when a diagnosis has been established with reasonable certainty very often turn the delicate scales against the patient. Stasis promotes infection and disturbed metabolic, fluid, electrolyte, and nitrogen balance. Obstruction in the biliary tract, the urinary tract, the gastrointestinal system, and the pulmonary tree call for as prompt surgical intervention as is compatible with adequate and safe preparation of the patient for operation. By way of illustration, the rate of operative mortality in obstructive lesions in the biliary tract is heightened by cholemia and cholangitis caused by unnecessary delay. Analogous situations arise in other systems. Early relief of obstruction is mandatory. Preliminary decompression of the gastrointestinal and urinary tracts by one of the various tube devices can be life-saving and produce a smoother postoperative course.

TABLE III.—CAUSES OF DEATH

	Principal causes	Important contributory causes
Bronchopneumonia	28	10
Cardiac dilatation	27	3
Pulmonary edema		
Peritonitis	18	1
Thrombosis and embolism	7	2
Sepsis	7	1
Pyelonephritis	6	15
Coronary occlusion	3	2
Anesthesia	2	—
Lung abscess	1	—
Metastatic carcinoma	1	12
Decubitus ulcers	—	5
Pulmonary tuberculosis	—	3
Bronchiectasis	—	2
	100	

OPERATIVE PROPHYLAXIS AGAINST MORTALITY

Anesthesia. Proper anesthesia is one of the major factors which contributes to a safer operative and postoperative period. The skilled anesthetist, armed with the newer concepts in chemistry, physiology, and pharmacology as they relate to surgery, usually determines the type of anesthesia after analysis of the hospital record and after consultation with the surgeon. Measures to alleviate excitement immediately before operation are especially indicated in the aged. The choice and dosage of preoperative sedation are selective. As a general rule, minimal sedation is advisable. Smooth induction of anesthesia in appropriate anesthesia rooms is highly desirable. The new experience may be grotesque and frightening to patients if induction is accomplished in the operating room. The clash of instruments, the hiss of sterilizers, men and women in white, and a disturbing word which is dropped inadvertently may all contribute to unnecessary excitement.

An evaluation of anesthetics in geriatric surgery has been made in a previous communication (10). The success of local anesthesia is dependent upon its technical application and upon the patient selectees. For example, local anesthesia is highly satisfactory in procedures for decompression of abdominal viscera, the repair of inguinal hernias, and the excision of superficial growths. The use of novocaine (1 per cent), without the addition of adrenalin, is preferred because the adrenalin tends to make the patient excitable and nervous. It is also better to detect and to tie bleeders than to promote temporary blood vessel constriction by adrenalin.

Spinal anesthesia, with its various refinements, is very helpful in prolonged lower intra-abdominal procedures and in amputation of the lower extremities. It is contraindicated in patients with organic disease of the central nervous system and in those with deformity or arthritis of the spine. It is also contraindicated in those with marked hypertension or nephritis, in whom the accompanying drop in blood pressure may cause an acute suppression of renal function.

All inhalation anesthesias should be accompanied by ample oxygenation. Cyclopropane seems preferable to all other inhalants. It is less toxic and makes for the smoothest postoperative recovery. Ethylene has been discontinued because of its explosive risk and its tendency to cause anoxia. Ether, administered by the open-drop method, is still a good supplemental and stimulating anesthetic. Nitrous oxide and oxygen is useful for short anesthesias.

Avertin anesthesia in the aged should be used with a great deal of caution. It is contraindicated in those with diminished cardiac reserve, liver disease, chronic pulmonary conditions, and in those who are in shock. If the patient does badly during operation, it is difficult to prevent further action of avertin and he may just "sleep away."

The intravenous use of sodium pentothal for short operative procedures is gaining favor.

Curare as an adjunct to the lighter anesthetics is gradually becoming more acceptable, especially in upper abdominal procedures. The pure alkaloid yields an agent which produces complete muscle relaxation by interruption of the normal action of acetylcholine at the myoneural junction. This eliminates bronchospasm.

A stomach empty of food during operation helps to guard against vomiting with its attendant risk of aspiration, choking, atelectasis, or aspiration or lipoid pneumonia. Suction of the nasopharynx to dispose of excess mucus should be routine.

Some of our concepts in crymal anesthesia need revision. We have recently noted that in the average case there is no more shock after amputation with a well selected general anesthetic than with crymal anesthesia. Three of 4 patients in our autopsy protocols who had midthigh amputations for arteriosclerotic gangrene died of massive thrombosis in the large vessels. All these patients were operated upon under crymal anesthesia with the tourniquet technique. We must suspect, therefore, that the tourniquet, by causing unnecessary trauma to blood vessels already diseased, may cause extensive thrombosis. It seems logical that in amputations for all peripheral vascular disease the tourniquet is contraindicated. Crymal anesthesia, without the tourniquet technique, is indicated for patients who are extremely bad risks and for those who have spreading infection.

Technique. In geriatric surgery especially, technical procedures which are too late, too little, or too much may be great predisposing factors to mortality. When the head and hands work together, when there is a minimum of lost motion and tissue trauma, and when there is meticulous attention to hemostasis, the precipitation of irreversible shock and of postoperative storm are unlikely. An unskillful and time-consuming cholecystostomy certainly involves more risk than a skillful and rapid cholecystectomy. Indicated stage operations reduce mortality. Disembowelment in abdominal procedures, especially in intestinal obstruction, should be guarded against as far as possible. Through-and-through abdominal sutures can be life-saving when a lengthy operation produces an imminent hazard. Retention sutures in celiotomies, careful approximation of tissue planes, and nonabsorbable suture material lessen the possibility of wound disruption.

Amputation stumps on the operating table have created a perplexing problem to many as a result of recent war directives and war experience. For practical purposes, the Surgeon General's Office deemed it advisable to adopt a standard method of amputation, leaving the stumps open and applying traction. A war wound in a comparatively young man, which necessitated a midthigh amputation, almost always had a virulent mixed infection plus a latent period before operative therapy could be carried out. Medical officers became so thoroughly indoctrinated with the principle of traction on stumps which were left open, that some of them have permitted this practice to become standard in amputations for peripheral vascular disease as well. Other surgeons maintain that civilian experience has taught them that results will be good when most midthigh amputa-

tions for peripheral vascular disease are handled by tight or loose closure, according to the clinical condition and the extent of blood vessel involvement which are ascertained during operation. They are convinced that most stumps heal satisfactorily and quickly and that when the other technique is used wounds take much longer to heal, asepsis and nitrogen balance are difficult to maintain, and an end-bearing stump is produced which is far from satisfactory and frequently in need of revision. Unless there is obvious ascending infection or marked thrombosis of the femoral vessels in arteriosclerotic or diabetic gangrene, it has been our practice to close stumps by the approximation of muscle, fascia, and skin. Should there be evidence of wound infection or breakdown, appropriate measures are taken. Generally, the results have been better with this program.

Supportive therapy. This strives to overcome the hazards of anesthesia, operative trauma, blood loss, a negative fluid, electrolyte, and nitrogen balance, and the impaired function of vital organs. A good anesthesia with ample oxygenation, a continuous intravenous drip of whole blood, plasma, human serum albumin, or glucose in saline solution, and the use of analeptics such as synephrin in patients who are in a shock state, all contribute to a safer operative procedure. Old patients can take more than 500 cubic centimeters of blood or other fluid intravenously with far greater safety than is generally supposed, provided that the drip rate is regulated to serve the clinical condition of the patient, as the diminished elasticity of the vascular system, with its concomitant lack of adaptability to rapid changes in blood volume, may put an increased load on the already damaged heart and result in acute cardiac dilatation. Improved color, pulse, and blood pressure readings indicate the necessity for a slower infusion rate.

POSTOPERATIVE PROPHYLAXIS AGAINST MORTALITY

Supportive therapy. This aims to correct shock induced by blood loss and trauma, and to restore impaired circulatory function and nutritional balance. The value of whole blood in the first two and its beneficial effect on the circulatory and kidney functions are established. There is no ideal substitute for oral food intake. When there are factors which vitiate comparatively normal assimilation or when tube feeding is difficult, parenteral alimentation serves its supporting and life-saving purpose. Elman, Werner, Koop (21), Fagerstrom, and Mason and Zintel have discussed basic principles for the maintenance of nutrition in surgical patients, with particular emphasis on nitrogen, fluid, and electrolyte balance. In view of the disturbed cardiac and kidney functions in the aged, the margin of safety for intravenous infusion is diminished, and in selected cases it may become advisable to use clyses. Patients who have salt retention or in whom this is induced by too high salt administration become susceptible to water retention and fixation of extracellular protein. A urine with a specific gravity below 1.015 points to adequate hydration, and it is desirable that the output should be at least 1,000 cubic centimeters. The average daily water requirement is 2 liters. This may have to be doubled in patients who have suffered dehydration through vomiting, diarrhea, intestinal fistulas, anorexia, excess perspiration, or gastrointestinal decompression. Mulholland *et al.* (31), Brunschwig *et al.*, and Casten *et al.* have made studies to show that there is postoperative nitrogen loss. One gram of protein per kilogram of body weight is an average daily requirement, but after operative or other traumas such requirement may have to be doubled or tripled in order to maintain a positive nitrogen balance. Lowered physical activity can diminish nitrogen metabolism, but a high carbohydrate intake may compensate for this. Hydrolysates and parenteral administration of pure amino acids furnish a high nitrogen intake. The rapidity with which the amino acids may be given may facilitate early ambulation and better sleep. It is advisable to provide glucose and salt apart from the amino acid mixture. The use of one-sixth molar sodium lactate solution to prevent acidosis is indicated. The parenteral maintenance of a nitrogen balance is continued until the daily food intake provides it.

Early ambulation. It is generally conceded (23) that this radical departure from past practice, with its tendency to prompt promotion of normal function, has had a definite effect in the reduction of postoperative morbidity and mortality and has proved to be a conservative procedure. Over 30 years ago, one of our teachers of surgery at the College of Physicians and Surgeons, Columbia University, the late William Cogswell Clarke, preached a surgical sermon of early in-bed mobilization of postoperative patients and he exhorted his students to "let 'em kick their legs around." He feared the bad effects of a slowed circulation. Education of the public has dispelled the fear of early ambulation and contributed to confident co-operation. The method has cut in half postoperative pneumonia, distention, difficulty in urination, elevation of temperature, wound disruption, and thrombosis. Formation of bed sores has been diminished, atrophy of disuse lessened, vital capacity increased, and the cough reflex stimulated. Morale has been strengthened, appetite,

sleep, and strength improved, and the necessity for sedation diminished. Hospitalization and expense have been curtailed. It has been gratifying to note that, especially in geriatric patients, the earlier the ambulation, the better. For example, practically all of our patients have inguinal hernia repair under local anesthesia and they are encouraged to walk and use the bathroom on the day of operation. A patient who has an abdominoperineal resection sits in a chair the day after operation and takes a few steps. Early ambulation is interdicted in those who are in danger of imminent cardiac failure, or who have hyperpyrexia, weakness, profound shock, or severe hemorrhage.

Oxygen therapy. This is routine for at least 24 hours after operation for patients who have had the more major surgical procedures, especially those in the upper abdomen. Oxygenation in the aged, many of whom have some type of anemia or local or general anoxia, increases the oxyhemoglobin with the result that pulmonary and tissue respiration is better and easier, vital capacity is increased, and the cardiac load is diminished. In order to obviate oxygen want, it is essential to relieve respiratory depression, obstruction in the respiratory system, shock, and oxygen replacement by other gases. A 50 to 100 per cent increase in concentration of alveolar oxygen is desirable. The administration of 100 per cent oxygen causes a 10 to 15 per cent increase in oxygen in the arterial blood and a slightly higher increase in the venous blood (6). This can reduce the mortality in shock (4, 17), acute cardiac decompensation, circulatory failure, pulmonary edema, pneumonia, and abdominal distention. When the use of an oxygen tent is impractical, oxygen insufflation may be substituted with the help of an oxygen mask, an oropharyngeal catheter, or nasal cannulae.

Phlebothrombosis, thrombophlebitis, and embolism. The highest incidence of thrombosis is likely to occur in the older age groups (2) and during the colder months (16). The major etiologic factor is stasis in the deep leg veins. In our autopsy findings unsuspected massive thrombosis occurred in 9 per cent of the patients. In 7 per cent, this was the principal cause of death. Thrombophlebitis with its evident symptoms and signs, is usually recognized early and easily, provided that a careful, routine, daily examination of the lower extremities is made. The thrombus of phlebothrombosis, however, is more insidious, and difficult to diagnose. The presence of compensatory dilatation of superficial veins, edema of the ankle, cyanosis of nail beds, calf tenderness, and Homan's sign suggest the presence of phlebothrombosis, especially if the temperature, pulse, and respirations are mounting. Embolism may be easily overlooked, but if it is diagnosed it may be the first lead in the recognition of the basic pathological condition. In this connection, it is suggested that the descriptive adjective "bland" associated with the thrombus should be abandoned, for no thrombus can be bland in view of its potential embolic hazard.

Early ambulation, in its strictest sense, has been the most potent prophylactic against thrombosis. The observations of Morton and his associates on thrombosis and embolism, based on autopsy findings, are significant. They emphasize, among many other things, the most common incidence in the sixth, seventh, and eighth decades, and the tendency toward fatal embolism in patients with impaired cardiac action. The "jackknife" position in bed predisposes to puddling in vessels near the popliteal and femoral creases. These authors recommend slight elevation of the extremities in extension. Allen (1) is convinced that geriatric patients should have prophylactic interruption of both superficial femoral veins in order to guard against thrombosis and embolism. His conclusion is based on a well controlled group of 458 cases. He is averse to the use of anticoagulants in the aged if they have metabolic, renal, or liver disturbance, arteriosclerosis, or hemorrhagic diathesis. We have not hesitated to use heparin and dicumarol in indicated cases of thrombosis, provided that there is a daily check on the prothrombin time. For the present, we prefer this therapy, together with early ambulation, to the use of prophylactic ligation of the superficial femoral vein. It is possible that this concept will change. Vein ligation above the clot, thrombectomy, and the use of anticoagulants for phlebothrombosis, especially if complicated by embolism, is an accepted procedure. When femoroiliac thrombophlebitis in the presence of repeated infarcts is suspected, lifesaving ligation of the common iliac vein or inferior vena cava may have to be performed (Veal *et al.*). Aycock and Hendrick have had remarkably good results in thrombophlebitis from paravertebral lumbar sympathetic block with 1 per cent procaine hydrochloride and monobromsaligenin.

Decubitus ulcers. These, often multiple, are commonly seen in aged surgical patients, especially those who have neurological conditions. The most frequent sites are in the sacral, trochanteric, calcaneal, and scapular regions. Our autopsy statistics show that decubitus ulcers were the contributory cause of death in 5 per cent of the patients. Like all open wounds, they frequently initiate a serious downhill clinical course by de-

pletion of protein reserve and, at times, by sepsis. Their debilitating effect produces anorexia and diminished resistance to infection, resulting in a vicious cycle of persistent chemical imbalance or sepsis unless appropriate therapy is vigorous. A significant contribution to such therapy was made by Mulholland *et al.* (32), who demonstrated that decubitus ulcers will heal quickly if hypoproteinemia is reversed and a positive nitrogen balance is maintained. Additional therapy which has yielded the best clinical results is the relief of local pressure by early ambulation, repeated change of position in bed, rubber rings and air mattresses, local cleanliness, skillful nursing, and minimizing the maceration of skin due to incontinence. Basic surgical principles in the local treatment of the ulcer are indicated.

We have tried, without success, plastic closure of some of the larger decubitus ulcers. The successful results which have been obtained by this procedure in young soldiers are difficult to duplicate in the aged because of circulatory and nutritional disturbance, diminished resistance to infection, and, in some cases, incontinence.

Pneumonia. The high morbidity and mortality of postoperative pneumonia make this one of the major problems in geriatric surgery. This disease was the principal cause of death of almost one-third of our patients. The stealthy clinical syndrome, the masked and sometimes absent physical signs, the unpredictable temperature curve, and the common absence of cough all contribute to make it easy to overlook the diagnosis, especially if the patient has antibiotic therapy. The most reliable diagnostic aid is the chest roentgenogram. The most important signs are increase in pulse and respirations, temperature, and scattered subcrepitant rales. Good anesthesia, early ambulation, deep breathing, supportive cardiac therapy, and the routine postoperative use of penicillin and oxygen are the strongest prophylactic measures.

Fresh air and sunshine. The influence of the physical and mental stimulation of fresh air and sunshine with the associated change in scenery cannot be overemphasized. One of the characteristics of aged ward patients is an inertia which tends to make them congregate in groups indoors, even when weather conditions are favorable. They have an unfounded fear of drafts and pneumonia, especially in the winter months. Recently, on a mild and beautiful grand-rounds day, most of the ambulatory male patients were found seated in the day room. One of the old men was told to take advantage of the outdoors on a porch. He looked up and countered with a quizzical, "Why?". The staff was floored and it left beaten but amused. Attractive day rooms, mild recreation such as checkers and card games, reading, and various forms of occupational therapy help create a resistance to the outdoors. It is part of the job of the nursing staff to overcome this resistance.

SUMMARY

1. The co-operation and function of the surgeon in geriatric practice are becoming more important because of the progressive increase in the span of life.

2. The principal and contributory causes of operative mortality are enumerated from an analysis of 100 consecutive autopsy protocols of extreme substandard risk patients over 60 years of age (average 72 years), who died within a month after operation. The three outstanding principal causes of death were bronchopneumonia (28 per cent), cardiac dilatation and pulmonary edema (27 per cent), and peritonitis (18 per cent). Other principal causes of death were thrombosis and embolism, sepsis, pyelonephritis, coronary occlusion, anesthesia, and lung abscess. The three outstanding contributory causes of death were pyelonephritis, metastatic carcinoma, and bronchopneumonia. Most of the deaths after biliary tract operations were caused by cardiopulmonary conditions; after gastrointestinal operations, by peritonitis; and after genitourinary operations, by cardiopulmonary conditions and pyelonephritis.

3. The importance of early operative intervention, thorough preoperative preparation, and of good technique is emphasized.

4. It is to be expected that deaths from emergency operations will be about two and one-quarter times greater than deaths from non-emergency operations.

5. There are various measures which help in preoperative prophylaxis against mortality. It is important to establish a reasonably correct diagnosis in order to plan a surgical procedure. Old people do not stand operation well in hot or humid weather. The importance of a positive nitrogen, electrolyte, and fluid balance, in order to increase homeostasis, strength, good wound healing, and resistance to infection, has been established. Enteral intake is preferable to parenteral therapy. The maintenance of a comparatively normal blood sugar in diabetes is advocated. Because so many patients die of cardiac failure, routine digitalization before operation may be helpful, despite the thromboplastic tendency of digitalis. Coronary sclerosis per se or an accompanying angina pectoris is not a contraindication to operation. The routine administration of penicillin preoperatively and postoperatively is recommended. A correct

psychological approach to the patient and an optimistic bedside manner are very constructive. Many patients die because conservatism at the wrong time brings them to operation too late. This is true especially in conditions which involve infection, gangrene, malignancy, and obstruction in various systems.

6. There are various measures which help in operative prophylaxis against mortality. Anesthesia for the aged is evaluated. Cyclopropane is the preferred general anesthetic. All general anesthesias are best when accompanied by ample oxygenation and at times by curare. Crymal anesthesia for lower extremity amputations should be limited to those patients who are extremely bad risks or to those who have spreading infection.

Reasonable speed, gentle manipulation, and careful hemostasis are all part of a good technical procedure. The use of a Murphy button for palliative gastroenterostomy in carcinoma of the stomach is recommended. Except in obvious ascending infection in peripheral arteriosclerotic or diabetic vascular disease, it is preferable to close amputation stumps loosely or tightly, according to the findings at the time of operation. The use of a tourniquet is interdicted, because the blood vessels are vulnerable to thrombosis.

The use of supportive therapy by the parenteral administration of blood, blood substitutes, glucose, and saline solution has been life-saving.

7. There are various measures which help in postoperative prophylaxis against mortality. Supportive therapy for shock, the correction of impaired circulatory function, and the maintenance of nitrogen, fluid, and electrolyte balance are presented. Early ambulation, oxygen therapy, the detection and therapy of phlebothrombosis, thrombophlebitis, embolism, and pneumonia, and the prevention and therapy of decubitus ulcers, all contribute to lessen morbidity and mortality. The importance of good nursing, fresh air, and sunshine is emphasized.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Classification of Extensive Cysts of the Jaws. G. VICTOR BOYKO. *J. Oral. Surg.*, 1947, 5: 325.

The present study centers chiefly around odontogenic cysts. Usually unilateral, such cysts may reach extensive proportions and erode through the bone. Those in the maxilla may obliterate the antrum, extend into the orbit, the pterygoid fossa, and invade other vital structures.

The most common type of cysts are the radicular cysts which extend from the periapical regions. These are usually detected during routine oral examinations and are, therefore, seldom productive of marked tissue damage.

The second type, or the follicular group of cysts, results from retrograde changes during tooth development with subsequent enlargement of the enamel organ. The stage at which changes occur determines whether the follicular cyst is to be simple, dentigerous, periodontal, odontomic, or multiple. When extensive, follicular cysts, particularly of the dentigerous type, may contain potential ameloblastoma tissue.

The third group, the ameloblastoma or adamantoblastoma, possesses invasive and destructive properties and necessitates wide excision. Traumatic or hemorrhagic cysts and cysts arising from embryonic fissures, though not odontogenic, may present similar findings and often lend themselves to the same form of treatment as the radicular and follicular types. In combination with x-ray studies, the injection of lipiodol into the cyst may be of aid in establishing a diagnosis. The diagnosis, however, may remain in doubt until aspiration or several tissue biopsies (or both) are performed.

When essential teeth or vital tissue structures are uninvolved, the lesion is enucleated or the cystic membrane is exenterated, care being taken to avoid deformity and to maintain normal function by preserving as much of the alveolar ridge and muscles as is safe. In the presence of ameloblasts and lesions with malignant tendencies, radical resection, often followed by radiation therapy, is urged.

Exposed teeth may be retained as pulpless teeth after their devitalization, or they may be left in temporarily to aid in the healing process. However, when extensive cysts encroach on vital structures, conservative operations may be substituted. The open or Partsch procedure consists in placing a window in the most accessible portion of the cyst, thereby converting it into an accessory part of the oral cavity. Similarly, communication may be established by means of a foreign body which permits drainage and allows irrigations to be carried out until the cyst shrinks and healing occurs. In some instances, a portion of the lesion may be removed in a radical manner, whereas the balance of the cyst may be treated more conservatively. Moreover, eradication becomes possible occasionally only after a preliminary conservative operation has been performed.

The approximation of soft tissue edges, the immediate use of appliances to retain bone fragments in a functioning position, the institution of oral hygiene, the use of agents with which to combat infection, postoperative exercises, and physiotherapy are all helpful in achieving a successful result.

DAVID H. LYNN, M.D.

The Use of Vitallium Plates to Maintain Function following Resection of the Mandible. B. S. FREEMAN. *Plast. Reconstr. Surg.*, 1948, 3: 73.

Resection of the mandible necessitates immediate postoperative fixation of fragments to prevent external and internal distortion resulting in respiratory distress, feeding problems, and severe deformity. In adults with teeth retention of the proper relationship between fragments, with the later restoration of bone, continuity can be accomplished with intraoral wires or dental splints. In edentulous adults and in children, retention of the fragments is difficult. Immediate bone grafting, in our experience, has failed because of either oral contamination or incomplete fixation of the fragments. Following resection of a sizable portion of the mandible without stabilization, the mental anguish and depression, although great, are secondary to the immediate serious difficulty in respiration, mastication, and speech. Vitallium plates, fixing both fragments firmly in their original places and maintaining rigidity of the mandible during the period between operations, have been successfully used to prevent these sequelae.

Simple Sherman type plates of vitallium, in varying sizes, can be bent to proper curvature in the operating room. If necessary, a specially curved plate can be prepared in any dental laboratory equipped to make vitallium prostheses. The area to be resected is outlined; the metal plate is bent to the approximate desired curvature with a pair of pliers or the fingers; the positions of the plate holes are marked with drill holes made into the bony part to be left. After the oral cavity has been closed tightly, the wound irrigated, and the instruments and gloves changed, the plate is attached by small vitallium screws or bolts.

Even in the presence of wound infection, metal plates can be allowed to remain in position for a considerable period of time in order to stabilize the bone fragments and prepare them, if necessary, for a later graft.

LOUIS T. BYARS, M.D.

EYE

The Problem of Sympathetic Ophthalmia. BERNARD SAMUELS. *Irish J. M. Sc.*, 1947, 262: 610.

The problem of sympathetic ophthalmia is discussed. The author points out that the disease is characterized by the appearance of a specific infiltration in the pigmented and highly vascular uvea. This infiltration is composed of three elements: lymphocytes, epithelioid cells, and giant cells. Artificially made openings of the eyeball with incarceration of uveal tissue generally result in sympathetic ophthalmia.

Wounds of the sclera in the "danger zone," i.e., over the ciliary body, are more serious than wounds elsewhere because of the greater tendency of the uvea to prolapse. Ruptures at the limbus are most grave because the root of the iris, alone or together with the ciliary processes, may become incarcerated. The larger the perforation the greater the hazard.

Evisceration, iridesis, and repair of iridodialysis are unsafe procedures. Cataract extraction with a flap incision is considered much safer than linear extraction. Sympathetic ophthalmia may follow operations for glaucoma, regardless of the size of the opening, but not operations for detachment of the retina. Generally speaking, as long as an eye remains hard after an operation the probability of sympathetic ophthalmia is remote. Cataract extraction and operations for glaucoma are the two most common surgical procedures which result in sympathetic ophthalmia.

From 2 to 13 per cent of all cases of sympathetic ophthalmia originate in eyeballs with post-traumatic endophthalmitis septica.

The incidence of sympathetic ophthalmia after septic panophthalmitis is about 3 per cent.

The presence of an intraocular foreign body makes the eye sensitive and may excite irritation of the other eye.

Clinically, sympathetic irritation precedes the pathologic signs of sympathetic inflammation. Irritation is a warning of impending sympathetic ophthalmia. It disappears within a few days after the enucleation of the injured eye. Actual inflammation begins in the uninjured eye with disturbance of vision, pain, fine grayish precipitations on the posterior surface of the cornea, adhesions, vitreous opacities, and characteristic sharply defined small yellowish patches in the choroid.

In genuine sympathetic iritis (iritis maligna) the entire posterior surface of the iris is agglutinated to the capsule of the lens, unlike iritis serosa in which the pupil is free, or plastic iritis in which incomplete adhesions are confined to the pupillary zone. The presence of greyish nodules at the pupillary border and on the lens capsule is considered the most significant clinical sign of sympathetic ophthalmia in the anterior chamber.

Various theories have been presented to explain the pathogenesis of sympathetic ophthalmia—allergy and infection (tuberculosis or virus infection).

The time to enucleate the injured eye is: (1) when the fellow eye is irritable, even if it be apparently normal; (2) when keratic precipitates appear in the fellow eye; (3) in cases in which there is no hope that the eye will ever again be serviceable; and (4) when endophthalmitis is present.

The eye should not be enucleated: (1) when the wound heals properly, the tension is good, sight is retained, and the fellow eye shows no irritation; (2) when the injured eye still has some vision after the fellow eye has become severely inflamed; (3) when both eyes are violently inflamed; and (4) when panophthalmitis is present. Excision should be postponed until the inflammation has subsided.

Iridectomy for relief of secondary glaucoma should be avoided. Paracentesis is the sole operation that is permissible.

A complicated cataract which develops in the sympathizing eye should not be removed for many months.

With regard to medical treatment, it is pointed out that miotics may increase the central synechia, and mydriatics may produce glaucoma. Salicylates, mercury, salvarsan, tuberculin, sulfonamides, penicillin, and fever therapy have been tried.

JOSHUA ZUCKERMAN, M.D.

On Results Obtained by Total Conjunctival Hooding of the Cornea for Serpiginous Ulcer. A. KETTESY. *Brit. J. Ophth.*, 1948, 32: 36.

The author reports 56 cases of serpiginous ulcer treated by total hooding as compared to 112 cases in which the ulcers were medically treated, on the basis of visual acuity and hospitalization time.

The procedure is as follows: The bulbar conjunctiva was detached all around the limbus and was undermined into the upper fornix. The ulcerated parts of the cornea were scraped and the conjunctiva was anchored with catgut sutures in the episcleral tissue in a horizontal line 3 mm. below the cornea. Pain, lacrimation, irritation, and edema disappeared shortly after hooding. Removal of the hood was done not less than 6 months after the operation in order to prevent recurrence of the ulcer. Total hooding without prior medical treatment was recommended when vision was limited to hand movements or less, since it guarded against full visual loss. The number of improved cases and the improvement of vision were almost twice as great with the hooded method as compared to the medical treatment. Hospitalization time was cut nearly in half. This method has been extended by the author to all unhealed or poorly healing acute and chronic keratitic processes, with good results.

ROGER H. JOHNSON, M.D.

Human Conjunctiva Grafted on the Chorioallantois of Chick Embryos. A. FEIGENBAUM and W. KORNBLUETH. *Arch. Ophth.*, Chic., 1948, 39: 67.

The authors report the grafting of human conjunctiva on the chorioallantois of chick embryos. An oval piece of conjunctiva was removed from the

lower fornix of the human being and transferred to an isotonic solution of sodium chloride containing penicillin. Fertile hens eggs incubated for a period of 8 to 12 days were used in the grafting experiments. After cleaning the egg with alcohol, a one centimeter square window was cut in the shell. The shell was then perforated at the location of the air bubble with a sterile needle and the air aspirated. In this way the fibrous membrane was separated from the adherent chorioallantoic membrane of the shell, which made it possible to cut the fibrous membrane without injuring the chorioallantois. A 2 mm. to 3 mm. square piece of conjunctiva was deposited on the chorioallantois at the site of the large membrane vessels. The shell window was framed with paraffin and sealed with a cover glass. The needle hole was sealed and the egg was then incubated at 38 degrees centigrade. Twenty-four hours later, 300 units of penicillin were instilled on the chorioallantoic membrane near the graft. This was repeated 48 hours later. After a period of 6 days the experiments were concluded and the graft, together with the adherent chorioallantoic membrane, was removed and then stained.

At the end of the 6 day period of incubation, the conjunctival graft was pinkish in color and was adherent to the chorioallantoic membrane, the vessels of which were widened and more numerous. Microscopic examination showed that the epithelial cover of the transplanted conjunctiva varied in thickness but was usually thinner than normal. The cellular architecture was usually altered. The arrangement in layers was not always clearly discernible and the regular position of the nuclei was disturbed. The individual epithelial cells fairly constantly presented a normal appearance and were usually well demarcated. There was no distinct division between the epithelium and the subepithelial tissue. Groups of epithelial cells seemed to penetrate deeply into the subepithelial tissue at the border. Frequently the epithelial cover was infiltrated with chick polymorphonuclear leucocytes. Mitotic figures were noted in all layers of the conjunctival epithelium.

The subepithelial tissue was usually well preserved; the number of mononuclear cells was not increased, and the stroma contained a dense meshwork of collagen fibers. In many grafts a scanty infiltration of polymorphonuclear leucocytes was observed, the cells accumulating mainly at the border between the epithelium and the subepithelial tissue. Occasionally, small sharply delimited necrotic areas were encountered within the subepithelial tissue. The grafts showed an abundance of wide capillaries which arose from the chorioallantois and penetrated the graft. The capillaries were lined with flat and cuboidal cells and engorged with nucleated chick red-blood cells. Occasionally human red-blood cells were seen. The chorioallantoic membrane lost its ectodermal cover where the graft became adherent, but the ectoderm and the conjunctiva each maintained their own character. Only rarely were necrotic areas seen in the chorioallantoic membrane.

These experiments showed that it is possible to maintain fairly healthy human conjunctiva outside of the body without substantial alteration. Survival of the transplant is due to the fact that the graft is quickly incorporated into the vascular system of the chorioallantois. The vascular system of the conjunctiva probably becomes connected with that of the chick embryo. The pathological feature noted most frequently in the conjunctival graft was the infiltration of the polymorphonuclear leucocytes which originate in the chick embryo. This is probably a response of the host to a foreign tissue, and apparently does not interfere with the survival of the graft. Two reasons for unsuccessful grafts were infection and a tendency of some grafts to sink into the mesoderm. ROGER H. JOHNSON, M.D.

Transplantation of Vitreous. A Preliminary Report. HERBERT M. KATZIN and JOHN BLUM. *Brit. J. Ophth.*, 1947, 31: 760.

The authors conclude, from their experiments on rabbits, that transplantation of vitreous material leads to complications. At a later date they expect to amplify this report by experiments with human material. Several methods of transfer of vitreous were employed in 39 eyes.

Transplantation of vitreous was complicated by retinal detachment and cataract formation. Detachments of the retina in rabbits usually heal spontaneously; however, a few did not heal. Cataracts resulted from injury during the operation. There were no cases of chronic uveitis.

Transplantation of the vitreous was found to be more successful than replacement with saline solution because the eye metabolizes the injected vitreous and accepts it into its own structure.

Of 39 rabbit's eyes followed up for a period of 6 months, 6 developed detachments of the retina, 2 developed traumatic cataracts, and 7 presented a localized fibrous tissue proliferation around the puncture site.

These possible complications should be borne in mind when transfer of vitreous is considered as a clinical procedure. JOSHUA ZUCKERMAN, M.D.

Peripheral and Central Disturbances of the Visual Fields. An Aspect of Diophthalmology. N. A. STUTTERHEIM. *Brit. J. Ophth.*, 1947, 31: 721.

The author discusses some peculiar disturbances of the peripheral and central fields of vision. He presents 3 cases which he believes represent a form of disturbance of the peripheral vision or of central vision, or both, which does not have an organic or functional basis but is a disturbance of kinetic factors as revealed by the study of the bi-fovea and its correlate, convergence. He states that this condition is not yet recognized in ophthalmology as a clinical entity. He is of the opinion that kinetic treatment, which affects adduction, abduction, and bi-foveal fusion can effectively cure limitation of the peripheral field and failure of the central field of vision.

JOSHUA ZUCKERMAN, M.D.

A Case of Metastatic Osteosarcoma in the Choroid. V. T. Lees. *Brit. J. Ophth.*, 1947, 31: 713.

Metastasis to the eye is extremely rare. The author reports a case of osteosarcoma of the choroid which metastasized from a primary growth in the chest. Metastasis was presumed to have extended from an erosion in the carotid artery. The condition began with a sarcoma of the knee following injury. After amputation, metastases appeared in the chest. When the eye was first examined a patch of scleral hyperemia was present in the lower nasal area; the anterior chamber was shallow; the pupil was dilated and did not react to direct light, but did react consensually. The tumor was examined biomicroscopically. There were two nodules, one extending from the disc to the equator and the other from the equator forward. There was no visible pigmentation. The solid nature of the nodules was demonstrated by transillumination.

Later the detachment became total so that the tumor was no longer visible. Postmortem examination of sections of the eye revealed osteosarcoma which formed irregular trabeculae of osteoid tissue. The centers of a few trabeculae presented calcifications, but the bulk of the tissue was noncalcified. The tumor was a sarcoma which originated from bone.

The bone sarcoma in the knee had evidently spread to the mediastinum and from there to the eye by vessel erosion. The presence of a double tumor in the eye was suggestive of its metastatic origin. The sections showed the distinctive cell pattern of bone sarcoma.

Cases have been reported previously in which metastases occurred in the second and third nerves in the cranium, and in the second nerve and in the muscles within the orbit. Both eyes were affected by deposits in the choroid.

A similar case was described by Weiner (1902) and by Ballantyne (1905) following primary sarcoma of the chest. In both cases metastases occurred in the suprarenal gland, and in the brain, with deposits in the optic nerve extending from the disc to the retina. Heine (1899) described a metastatic sarcoma of the optic papilla. Schiess, Gemuseus and Rogh (1879) described a pigmented tumor of the disc which extended from a malignant melanoma of the skin. Neese (1907) reported a choroidal tumor which metastasized from a sarcoma of the breast, and Elschnig (1926) reported a tumor of the iris originating from a primary lesion of the ovary.

Joshua Zuckerman, M.D.

Intramural Vascular System (Vasa Vasorum?) in Retinal Vessels. Arnold Loewenstein. *Arch. Ophth.*, Chic., 1948, 39: 9.

Vessels within the wall of retinal vessels have not hitherto been recognized. In general, only the walls of vessels with a caliber greater than one millimeter are provided with vasa vasorum which arise from adjacent small arteries and form a dense capillary network in the adventitia. It has been shown that an intramural vascular system exists in the sclerosed aorta and in sclerosed coronary vessels. Here a rich vascular system has been found in the intima and within and around the arteriosclerotic plaques. In arteriosclerotic coronary arteries, intramural vessels arise from the lumen of the partly occluded vessel. A similar system was also found in the veins. This is not found in healthy vascular walls in young people. The author has observed single capillaries running within the hyaline thickened wall of sclerosed retinal vessels. The walls are extremely thin and difficult to see. The majority of intramural vessels run parallel to the lumen though they also run obliquely and in a circular course. They are more frequently found at points of bifurcation and, on serial sections, are seen to open into the lumen. Frequently the site of origin of intramural vessels in the intima was surrounded by a group of endothelial nuclei. The author was able to follow the intramural vessels, which are predominately capillaries, from their lumens in the retinal vessels into the hyaline coat and to demonstrate union with sister branches and the adjacent retinal vessels. This condition is never observed in normal retinal twigs. He found newly formed intramural vessels both in hyalinized arteriosclerotic vessels and in a case of subendothelial fatty necrosis, a typical atheroma. A large number of intramural capillaries were found in a patient with thrombosis of the central retinal vein. In vasculitis retinae, some regular capillaries were conspicuous and sharply delineated. In other places a far more irregular system of capillary channels had replaced the main vessel. These vessels contained a multitude of endothelium-lined lumens separated by a nucleated granular substance.

The intramural vessels, for the greater part of their course, remain within the hyalinized wall whether they run parallel to the lumen, in circles, or in spirals. They serve the nutrition of the diseased tissue. The metabolism of the normal wall of the small retinal vessels is maintained by the blood stream in the lumen; the diseased vessel wall, the hyaline thickened coat especially, demands more nutrition. The changed consistency of the tissue may act as an impediment to the movement of fluid. It is likely that oxygen tension and lack of nutrition are responsible for the stimulation of the formation of additional blood vessels. Since these intramural capillaries are made up of a simple endothelial layer and since they connect directly with the lumen of the vessel, their intracapillary pressure is higher and they rupture more easily. The intramural vessels may serve to transport blood over an occluded or narrow part of the lumen.

Roger H. Johnson, M.D.

The Blood Supply of the Optic Nerve. Derrick Vail. *Am. J. Ophth.*, 1948, 31:1.

The purpose of this paper is to review the anatomy of the optic nerve and its blood supply and to consider a few lesions in this regard. The gross anatomy of the optic nerve and chiasm are considered, and their relationship to the surrounding structures

within the brain and throughout the course of the optic nerve are discussed in detail. The chiasmal portion of the basal cistern which continues along the optic nerve toward the globe is reviewed.

The author believes that there is a separation between the intervaginal space and the perivascular connective tissue of the central vessels where they enter the optic nerve. The blood to the intracranial portion of the optic nerve is supplied chiefly by minute branches from the internal carotid artery and sometimes by the ophthalmic artery below, and superiorly by the anterior cerebral and anterior communicating arteries. The intracanalicular portion is supplied by pial vessels arising from the internal carotid and anastomoses with septal vessels from the orbital and intracranial portions of the nerve. The orbital portion is supplied by vessels that pierce the dura behind the entrance of the central vessels and those that join the pial network anteriorly at the site of the entry of the central vessels. The upper and lateral portion of the periphery of the nerve is supplied by branches of the ophthalmic artery, the posterior ciliary arteries, and recurrent or collateral branches from the central artery. The central portion of the nerve is supplied by branches from the central collateral artery and occasionally by a posterior axial branch from the central artery. The central artery usually comes from the ophthalmic, the long internal ciliary, the external ciliary, or the short posterior ciliary arteries. Where it enters the dura it gives off branches which go backward and forward and join the pial network to send branches to the optic nerve. Other branches from this network are sent to the lamina cribrosa and backward through the center of the optic nerve. The central retinal vein has numerous anastomoses near the papilla. After it leaves the nerve, it becomes the venous network in the orbital fat and empties into the cavernous sinus, the superior orbital vein, the inferior ophthalmic vein, or several combinations. The posterior central vein of the optic nerve collects blood from the orbital portion of the nerve and empties into the cavernous sinus.

The author correlates various details of the anatomy with clinical pictures that could be based on anatomical changes. ROGER H. JOHNSON, M.D.

EAR

Escape of Cerebrospinal Fluid into the Wounds of Operations on the Temporal Bone. H. I. LILLIE and ARTHUR A. SPAR. *Arch. Otolar.*, Chic., 1947, 46: 779.

An injury to the dura which permits the escape of cerebrospinal fluid into the wound during the course of an operation on the mastoid might seem alarming because of the serious implications of impending meningitis. However, the experiences reported seem to indicate that the difficulties may be overcome by surgical methods.

A review of the available literature pertaining to postoperative cerebrospinal otorrhea is given. The factors involved in the origin of a cerebrospinal fistula are described, and means of preventing the formation of a permanent cerebrospinal fistula are discussed. Methods which have been found successful in 4 cases for repair of dural defects of various sizes are described.

It would appear obvious that should an injury to the dura, which permits the escape of cerebrospinal fluid, occur during an operation on the mastoid process, it should be closed immediately rather than at a subsequent operation.

In case the escape of cerebrospinal fluid occurs as the result of the dislocation of the stapes, the precedent established is that any surgical interference be deferred because the escape of the fluid is usually controlled by natural reparative processes.

While it actually seems that when cerebrospinal fluid escapes into the mastoid wound, the wound apparently clears of evidence of infection rapidly, such a phenomenon should not be relied on to take place.

The present-day prophylactic use of penicillin and chemotherapeutic drugs is extremely beneficial and results are reassuring. These drugs are administered preoperatively and postoperatively. They were not available for use except in recently encountered cases.

NOSE AND SINUSES

Diseases of the Maxillary Sinuses Resulting from Pathologic Changes. KURT H. THOMA. *J. Oral Surg.*, 1947, 5: 271.

The maxillary sinus can become involved by a large variety of pathologic entities derived from the teeth or from diseases of the maxillary bones.

Hematomas from rupture of the infraorbital and superior alveolar arteries as a result of fractures may continue to bleed as evidenced by pulsating pressure and repeated epistaxis. Surgery may be required. Infection, of course, adds to the gravity of the situation.

Odontogenic maxillary sinusitis usually results from periapical infection, often in conjunction with excessive trauma incident to exodontia or other surgical procedures. When the process is acute, the antrum may be entirely obliterated by the edematous and infiltrated lining and the presence of a mucoid or purulent exudate. Inadequate drainage leads to constitutional as well as local manifestations. The diagnosis is apparent from careful physical examination alone, as a rule. Chronic infections, however, are more insidious in onset and the findings are frequently circumscribed initially. Later, localized abscesses, cysts or polypi, or both, may supervene and involve the antrum generally. Transillumination and roentgenography often aid in determining the cause as well as the extent of the infection.

Odontogenic cysts of the maxillary sinus are either radicular or, less commonly, dentigerous. Globulomaxillary cysts, from the embryonic fissure between the lateral incisor and cuspid, may similarly en-

croach on the antrum. The entire cavity may be obliterated and the outer wall may become thin and bulge. The contents of most cysts are mucoid, though radicular cysts often contain a mucopurulent material and cholesterol. Aspiration biopsies are frequently of diagnostic aid and may complement roentgenologic examinations by permitting the instillation of radiopaque media into the lumen of the cyst.

Occasionally, osteogenic or odontogenic benign tumors invade the antrum. The former group consists principally of osteomas and, more commonly, fibro-osteomas. Osteomas are usually attached to the wall by a pedicle whereas fibro-osteomas gradually change the architecture of the spongiosa of the bone. Odontomas are frequently encapsulated by connective tissue and thus lend themselves readily to enucleation.

Of the benign infiltrating tumors, adamantoblastomas and mixed tumors of the type that affect the salivary glands are of particular interest. Rapid invasion of the antrum is generally productive of marked disturbances. X-ray studies usually disclose a polycystic appearance of the former, and a dense shadow with coarse septa in the latter. In either case, however, biopsy is invariably the most reliable method of establishing a proper diagnosis.

Malignant tumors of the antrum may be primary or secondary. Fibrosarcomas or osteogenic sarcomas are rare and are seldom recognized while the disease is operable. In approximately 15 per cent of the cases, a "sunray" effect in the periphery of the tumor is revealed in the roentgenogram. Epidermoid carcinoma is much more common and may involve the sinus early and extensively in the absence of a large surface lesion. Occasionally the reverse obtains. If death does not supervene from metastasis to vital structures, destruction may be marked. The deep cervical lymph nodes are often involved early. Adenocarcinoma, encountered less often than squamous cell carcinoma, is highly invasive but metastasizes somewhat later. Roentgenography is indispensable and should supplement a careful physical examination. In many instances, however, the diagnosis will be established only after tissue biopsies are obtained.

DAVID H. LYNN, M.D.

Malignant Tumors of the Nasopharynx. THOMAS E. VAN METRE, JR. *Bull. Johns Hopkins Hosp.*, 1948, 82: 42.

Forty-six cases of malignant tumor of the nasopharynx admitted to the Johns Hopkins Hospital, Baltimore, Maryland, during the period from 1925 to 1946 have been analyzed. These tumors occur in individuals of all ages, in negroes and white people, in males and in females. In the present series, the incidence was highest in patients in the fifth and sixth decades of life; 63 per cent of the tumors occurred in males.

The symptoms and signs are considered in four main groups which may be classified as follows:

Nasopharynx. In all cases a visible growth was present which produced obstruction to breathing, discharge (frequently bloody), and pain.

Ears. Many patients had some, or all, of the symptoms and signs of tubal occlusion. including tinnitus, air conduction deafness, feeling of fullness in the ear, and retraction of the ear drums. Acute otitis media was present in one case.

Cervical glands. Enlarged cervical glands with signs of metastatic involvement were common. Sometimes these were present on one side; more often they were bilateral. The glands between the tip of the mastoid and the sternocleidomastoid muscle were most frequently involved.

Neurological symptoms. Symptoms and signs of involvement of cranial nerves were frequently present. Pain and anesthesia in appropriate distribution marked involvement of the sensory nerves; weakness, paralysis, and atrophy of appropriate muscles marked involvement of the motor nerves.

When the first symptom was neurological, it was fifth nerve pain in 85 per cent of the cases. Roentgenograms of the skull were obtained in 21 of the 46 patients. Definite erosion of the base of the skull was demonstrated in 12 instances. The soft tissue shadow of the tumor displacing the nasopharyngeal air column was demonstrated in 7 cases. The roentgenograms showed no evidence of tumor in 7 instances. Had anteroposterior and lateral films of the skull and stereoscopic films of the base of the skull been taken routinely in all cases, they probably would have revealed evidence of tumor in a large percentage of cases.

Autopsy examination was made in 7 of the 46 cases. In 2 cases, the findings were an ulcerated tumor in the nasopharynx with metastases in the cervical lymph nodes. In the first case the tumor was a squamous cell carcinoma; in the second, a round cell sarcoma. The round cell sarcoma had also extended to the retroperitoneal, axillary, and inguinal lymph nodes. There were no neurological manifestations and no demonstrable invasion of the base of the skull.

Five autopsies were performed on cases with neurological manifestations. In all cases, tumor infiltrated the bones at the base of the skull in areas where the nerves clinically involved might well have been affected.

The tumors are surface growing neoplasms which tend to overgrow their blood supply and become necrotic with secondary ulceration and infection; hence a certain amount of hemorrhage, discharge, and local pain is to be expected. If the growth is large enough, it is capable of producing nasal obstruction. Growths near the eustachian tube orifices produce obstruction with its train of otitic symptoms. The lymphatic drainage of the nasopharynx is rich with resultant early extension. The nasopharynx lies in close proximity to many cranial nerves as they emerge from the base of the skull. The roentgenogram and autopsy findings show basal invasion and involvement of the nerves. The fact

that the foramen lacerum and the eustachian tube allow an easy gateway to the region of the petrous tip probably accounts for the high incidence of involvement of the fifth nerve and the nerves to the extraocular muscles. The cervical sympathetic supply to the eye may be interrupted either here or in the neck by cervical metastases. Pressure on nerves with resulting irritation and ablation phenomena easily explains all of the symptoms noted in the appropriate distribution of the involved cranial nerves. In one instance actual invasion of the temporal lobe took place with a resulting agraphia.

A. B. VICENCIO, M.D.

MOUTH

Dominant Inheritance of Cleft Lip and Palate in Five Generations. AVERY R. TEST and HAROLD F. FALLS. *J. Oral. Surg.*, 1947, 5: 292.

The authors' study concerns a pedigree of cheilognathouranoschisis complex extending back for five generations. The complex as a whole was found to demonstrate the typical pattern of dominant mendelian inheritance. The degree of dominance varied greatly among affected persons, as did the expressions of the various aspects of the complex. The gene, however, exhibited sufficient dominance to fulfill the requisites of dominant inheritance of an irregular type. There was no evidence of sex linkage, sex limitation, or sex influence, nor was there any evidence in favor of the often expressed idea of greater frequency among males.

A marked variation in degree of expression of the gene was present. Singly or in combination, these anomalies indicate that the affected person, no matter how mildly involved, is capable of transmitting the trait in either severe or mild form to approximately half of his or her offspring. The authors, therefore, believe that the severity of the trait in a parent is no indication of the severity which may be expected in the offspring.

This phenomenon of variable expression of a gene, especially prevalent in the syndrome under discussion, is rather common in human heredity, and unless all living members of a family are carefully examined for aborted forms of the complex in question, the typical mendelian inheritance pattern may not be apparent.

Attention was also called to the fact that the very rare human anomaly of accessory salivary glands of the lower lip may be an expression of the cheilognathouranoschisis complex. This association was described by Straith and Patton in 1943. The authors also clearly show that this defect imposes socioeconomic handicaps, which depend upon the severity of the disfigurement. DAVID H. LYNN, M.D.

Palliative Procedures in Advanced Cancer of the Mouth. GRANT BECKSTRAND. *Radiology*, 1948, 50: 10.

Under the designation of cancer of the mouth are included those malignant neoplasms occurring on the vermilion portion (mucosa) of the lips, the buccal mucosa, gingivae, tongue (except for the base), the floor of the mouth, hard and soft palates, and anterior tonsillar pillars. Cancers of the tonsil, pharynx, and base of the tongue (all pharyngeal structures) will also be considered because of the continuity of structures with the buccal cavity and the similar problems which arise in the management of growth at these sites. Advanced cancers of the mouth and pharynx may be limited to a single anatomical structure or may involve several adjacent or distant parts of the body. Cancer of the lip may be advanced locally but still remain limited to the primary site or, again, it may extend to the corners of the mouth, the buccal mucosa, the gingival buccal gutter, or lower jaw, and yet not metastasize to the neck. Since the majority of lesions involve the muscularis of the lip, such neoplasms will eventually reach the neck nodes by way of the abundant lymphatic channels of that structure. Advanced cancers of the buccal mucosa may also extend to the upper or lower jaw and will frequently show cervical metastases.

With cancer of the gums there may be considerable destruction of the jaw bone, either from the disease itself or from radionecrosis if portions of bone have been exposed to vigorous radiation therapy. The buccal mucosa, floor of the mouth, tongue, anterior tonsillar pillars, and lymph nodes of the neck may be involved either by direct extension or by way of the lymph vessels. Cancer of the tongue, while usually arising from the margins or base, may involve a large portion of that organ, the floor of the mouth, the tonsillar pillars, and the pharyngeal wall; in most instances, in the advanced stage it will also show neck node metastases. Advanced cancers of the soft palate and tonsils of epithelial or lymphoepithelial origin are of a higher degree of malignancy than most cancers of the mouth and, therefore, besides direct extension to neighboring tissues such as the tonsillar pillars, floor of the mouth, base of the tongue, pharyngeal wall and extrinsic larynx, they almost invariably show neck metastases.

Most advanced intraoral cancers thus involve, besides the site of origin, the adjacent structures or the lymph nodes of the neck, or both. Therapeutically, both the primary locus and the secondary nodes must be considered carefully from a surgical and radiological point of view to obtain the highest rate of cure and the greatest degree of palliation.

The most common symptom is pain which may have been present for weeks or months, depending on the location and extent of the primary disease, the amount of infection present, and the degree of the metastatic involvement of the cervical lymph nodes. In cancer of the lip and of the anterior two-thirds of the mouth, and in most adenocarcinomas, pain usually appears late; it is limited first to the regional area, then extends along the lower jawbone, and eventually to the ear, neck, and side of the head, unilateral in the beginning but finally bilateral as the whole lip, the jawbone, and neck nodes are involved. In squamous cell carcinomas of the posterior third of

the mouth and pharynx, pain in the ear, due to ulceration and infection, is the early complaint. Later the pain increases in severity and is constant along the jaw and side of the head, involving both sides when the cancer has crossed the midline. Neck and shoulder pain appear as the metastatic nodes become large and fixed.

Trismus occurs, due to ulceration and infection in the mouth or throat, or cellulitis in the neck and mandibulotemporal region. Lumps in the mouth or throat are often the first manifestations of adenocarcinomas and mixed tumors; usually they are found in the buccal mucosa, soft palate, or tonsillar regions. Growing slowly, the tumor may attain large dimensions, and may form a mechanical barrier to swallowing and talking before ulceration and infection occur.

Severe dysphagia with extreme loss of weight and strength is common with ulcerations of the mouth and throat, and may extend to the hypopharynx or extrinsic larynx, and even to the esophageal opening. When the arytenoids and aryepiglottic folds become edematous, either from the disease or from secondary infection or radionecrosis, dyspnea and stridor may become evident. Bad taste and foul breath are associated with necrotic lesions. Bleeding from infected deep ulcers may terminate in anemia from long continued oozing or massive hemorrhage.

Lumps in the neck are often the earliest symptom, especially in cancers of the posterior third of the mouth, tonsil, and pharynx. They are painless at first, but later become enlarged and fixed, with pain and stiffness of the neck and shoulder; in many cases ulceration, continuous between the mouth and neck, occurs. Half of the face becomes a large oozing, drooling, bleeding, granular, necrotic, foul-smelling, ulcerated mass and the terminal course is protracted, painful, and pathetic.

A biopsy from the margin of the growth or an aspiration of the palpable nodes may be done without fear of crossing the normal neck barriers or of complicating the case should a radical neck dissection be decided upon. An open biopsy should be avoided.

The majority of advanced cancers of the mouth are incurable. Highly malignant cancers of the posterior third of the mouth and pharynx are not readily amenable to surgery but, fortunately, they are radiosensitive and fractional radiation gives fair results. Neck metastases are likely to be early and widespread, or even bilateral, and respond more favorably to irradiation. Most bulky cancers of the lip, with or without neck metastases are difficult to control by radiation therapy. Good results have followed wide excision of the primary lesion with plastic repair, combined with radical neck dissection when the cervical nodes are involved. Radical resection of the lip, jaw, tongue, floor of the mouth, or buccal mucosa, with radical neck dissection is curative in many cancers which previously were regarded as inevitably fatal. The majority of these tumors grow slowly, metastases are often limited to the upper half of the neck and are not amenable to radiation therapy. Fixation of the mandible is no longer considered a sign of incurability. For adenocarcinomas and mixed tumors, surgical removal is the procedure of choice, both for the primary growth and the nodes in the neck.

In patients with highly malignant cancers of the posterior third of the mouth and pharynx, in whom an attempt at cure is justifiable, daily doses of 200 to 300 roentgens (in air) for a total of 4,000 to 6,000 roentgens per portal should be used. Smaller doses at longer intervals are used only as a palliative measure. For metastases to the neck nodes, roentgen therapy is the treatment of choice. Too large portals extending beyond the margins of the tumor are ineffective. Roentgen therapy in moderate doses is frequently of value in cleaning up infection and may make surgical intervention safer in many primary lesions; it may also be of value in certain cases of neck metastases preliminary to neck dissection. Gold seeds of radon implanted in the nodes, combined with surgical removal or irradiation of the primary cancer, may be the procedure of choice for the aged and the weak. Recurrent cancers after surgical intervention call for palliative small doses of roentgen rays.

The palliative care of the patient with advanced cancer of the mouth is the obligation of the surgeon in those cases in which surgery is the treatment of choice. The task of the radiologist is not complete with the administration of roentgen rays and radium, but includes repeated examination, daily removal of slough, frequent packing of ulcers, institution of a proper dietary regime, relief of radiation reactions, and whatever contributes to the control of infection and the alleviation of the patient's suffering.

A. B. VICENCIO, M.D.

NECK

Effects of Vitamin A Deficiency on Thyroid Function Studied with Radioactive Iodine. MORTIMER B. LIPSETT and RICHARD J. WINZLER. *Endocrinology*, 1947, 41: 494.

Prompted by the lack of agreement concerning the effects of vitamin A deficiency on the thyroid function, the authors conducted an investigation of thyroid function in severe avitaminosis; radioactive iodine was used as a tracer.

The parents of the animals used in the experiment were maintained for a period of at least 2 months previous to breeding and for 14 days after birth on Sherman diet B without added lettuce or meat. On the fourteenth day mothers and litters were placed on a vitamin A-low diet. At 21 days the animals were divided into three groups: one with A deficient diet, one control group injected with 8 immunizing units of vitamin A daily, and the third group with 20 mgm. of carotene per kilogram daily. The animals were injected intraperitoneally with a tracer dose of about 50 microcuries of I^{131}. The separation of iodine fractions was after the method of Perlman, Morton, and Chaikoff. For determinations of total iodine, diiodotyrosine iodine, and thyrosine iodine,

aliquots were digested and distilled according to the procedure of Taurog and Chaikoff.

The experiment indicated that in avitaminosis A there is a decreased rate of formation of thyroxine. The glands of the rat were relatively heavier in the A-deficient group. The histological picture of A avitaminosis appeared as degenerative changes and distended thyroid follicles, both present concomitantly. The total I^{131} uptake was not changed; the inorganic I^{131} in the thyroid reached higher than normal values and decreased more slowly than in the controls. W. FOSTER MONTGOMERY, M.D.

Treatment of Graves' Disease with Radioactive Iodine. MAYO H. SOLEY and EARL R. MILLER. *Med. Clin. N. America*, 1948, 32: 3.

Radioactive iodine was first used in the treatment of thyrotoxicosis by Hertz in 1941. Hamilton, Soley, and Eichorn, Hertz and Roberts, and Chapman and Evans have done much of the fundamental work with this agent.

The authors injected 300 microcuries of carrier-free radioiodine, I^{131}, subcutaneously in rabbits and dogs. They found extensive necrosis, hemorrhage, polymorphonuclear infiltration, and arterial changes in the thyroid at 10 days. After this time the fibrosis gradually increased.

A careful description of the technique of standardization and calibration, method of administration, measurement of activity, and method of handling I^{131} is given. The uptake of iodine in normals is usually much less than 30 per cent. In frank untreated Graves' disease it is usually between 40 and 80 per cent; therefore, the use of tracer doses (100 to 250 microcuries) is of diagnostic value. In the dose range the number of iodine molecules is so small that no effect due to iodine is expected.

Thirty-three patients with Graves' disease were treated by orally administered radioiodine (I^{131}) and have been followed for a period of 3 months to 2 years. No nodular goiters were included since it is believed that these should be treated surgically. The smallest dose of I^{131} which produced a satisfactory remission was 800 microcuries, the largest dose 9,150 microcuries. The authors recommend a schedule including an initial dose of 2,000 microcuries with repetition of similar doses at monthly intervals until the required total dose is given.

Twenty-five of the patients in the series (75%) had satisfactory remission of symptoms and signs of hyperthyroidism in 1½ to 7½ months following the beginning of therapy. The average time was from 3 to 7 months. The results in the remaining 8 patients have been classed as unsatisfactory. These patients have either taken too long to return to normal or have not returned to normal within a year after treatment was started.

Careful studies were made of the change in estimated thyroid weight, basal metabolic rate, protein-bound iodine, uptake of I^{131} in the thyroid, and estimated time from the initial dose of I^{131} to return to normal.

In the successfully treated patients the weight of the thyroids decreased from an average of 30 gm. to less than 15 gm., the basal metabolic rate dropped from an average of plus 30 to minus 10. The protein bound iodine dropped from an average of 10.6 to 5.7 micrograms per 100 cubic centimeters. The average total dose of I^{131} was 2,726 microcuries.

In the unsuccessful group the goiters were larger, the basal metabolic rates higher, and the protein bound iodine was higher. It is believed these sicker patients were not given adequate doses. They probably needed from 10 to 12 millicuries.

Within from 24 to 72 hours after the administration of I^{131}, the thyroid becomes tender, the sedimentation rate is increased, and the protein bound iodines are increased. The symptoms of hyperthyroidism from the fourth to the tenth day seem to be increased. Changes in exophthalmos after I^{131} therapy were not significant.

I^{121} has a half life of 8 days and 1 microcurie distributed through 1 gm. of tissue gives 142 equivalent roentgens of beta ray energy during the course of its complete decay. Other clinics are using much larger doses than those used by the authors. As yet, no one knows whether a single dose of 12 millicuries is more effective than 6 doses of 2 millicuries.

Studies of dosage problems, measurement of radioiodine, and distribution of iodine in the thyroid indicate that further experience is necessary before conclusions can be drawn as to the place of this type of therapy in Graves' disease.

ROBERT R. BIGELOW, M.D.

Experimental Chronic Thyrotoxicosis in Guinea Pigs. The Hematopoietic System, Liver, Spleen, and Endocrine Glands (La thyréotoxicose expérimentale chronique du cobaye. Le système hématopoïétique, le foie, la rate et les glandes endocrines). F. LAVANI, A. ASCHKENASY, and J. MIGNOT. *Ann. endocr.*, Par., 1947, 8: 205.

The authors reproduced hyperthyroidism in immature female guinea pigs by the administration of powdered thyroid and made the following observations:

1. Chronic thyrotoxicosis is accompanied by an increase in leucocytes, polymorphonuclear cells, and eosinophils. The bone marrow becomes hyperplastic but the hemoglobin does not vary. This myelotropic action of the thyroid differs from that of the liver or hepatic extracts which are both cytopoietic and hemoglobinopoietic.

2. There is a functional inhibition of the thyroid gland characterized by a loss of small acini, an increase in the amount and age of the colloid, and a flattening of the acinar epithelium.

3. A hyperplasia of the adrenal cortex is found to occur.

4. There is a moderate hypertrophy of the spleen with reticular reaction but without lymphoid hyperplasia.

5. There are no histologic alterations of the liver.

EDWARD W. GIBBS, M.D.

Experimental Chronic Thyrotoxicosis in Guinea Pigs. The Osseous System (La thyréotoxicose expérimentale chronique du cobaye. Le système osseux). F. LAVANI, J. MIGNOT, M. CHAMPEAU, and A. ASCHKENASY. *Ann. endocr.*, Par., 1947, 8: 307.

Prolonged intraosseous administration of weak doses of powdered thyroid to guinea pigs produced certain bony changes. Radiologically there was a rarefaction of the femurs with a disturbance of the arrangement of the bony lamellae at the borders of the femoral head and trochanters. Histologically, there was a diminution of phosphorus and calcium around the edge of the bone, a disappearance of the spongy diaphysis, and a thickening of the cortex. No osteoclastic activity was observed.

The bone marrow showed evidence of hyperactivity which is in accordance with the hematopoietic activity of the thyroid. There was no consistent change in the serum calcium, phosphorus, or phosphatase. No findings were similar to those of parathyroid osteosis. EDWARD W. GIBBS, M.D.

The Mortality of Thyroidectomy (Mortalitaet der Strumektomie). M. RICHARD. *Helvet. chir. acta*, 1947, 14: 396.

The author reports a mortality of 0.34 per cent in 3,840 thyroidectomies (13 deaths) from 1931 to 1947. The series includes all operations on the thyroid gland for nontoxic, toxic, Basedow's, malignant, inflammatory, and recurrent goiters. The 13 fatal cases were classified as nontoxic goiters (6), toxic goiters (6), and Basedow's disease (1). There were no fatalities in the recurrent, malignant, or inflammatory groups. No deaths occurred as a result of hemorrhage, wound infection, myxedema, or of tetany.

The causes of death were: cardiac insufficiency (1), air embolism (1), pneumonia (2), and postoperative toxic crisis (9). Postmortem examinations showed that of the 9 cases of so-called postoperative toxic crisis, there were only 2 in which no pathologicoanatomic changes could be found to account for death. In the remaining cases the postmortem examination revealed 2 instances of persistent thymus, 2 of suffocation from laryngeal edema with bloody infiltration of the mediastinum, 2 of toxic coma with bloody mediastinal infiltration, and 1 instance of lung carcinoma. The author believes that in many cases of postoperative crisis, and especially when it occurs in nontoxic goiter, there is a hemotoxic histamin like substance which damages the autonomic cardiac nerves and ganglia and accounts for the bloody mediastinal infiltration.

JOHN L. LINDQUIST, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Cerebral Angiography with Ioduron (Angiografia cerebrale con joduron). MARINO QUARTI TREVANO. *Chirurgia*, 1947, 2: 157.

The new shadow producing preparation which has recently come on the market is a stabile water soluble salt containing 55 per cent of iodine combined as a diiodate of pyridone. It can be injected in 30 per cent solution, and it is much more fluid than thorotrast. No damaging effects have been reported from its use. Following injections into experimental animals no free iodine was excreted through the kidneys. The author has now completed 100 angiographies using this preparation by percutaneous injection into the internal carotid artery. At least 2 injections were made in each subject studied and in a few instances as many as 4 injections were practiced at one sitting. The minimum amount for one injection has been 7 c.c. and the maximum 14 c.c., with a total amount not exceeding 40 c.c.

The patient, partially stupefied by oral and intravenous drugs, is placed supine with head extended and the needle is entered over the pulsating artery just below the upper border of the thyroid cartilage. If the oscillations of the needle upon reaching the artery are not perfectly vertical it is considered that the needle has struck the vessel tangentially and the instrument is withdrawn and reinserted at another point. The ioduron is injected rapidly into the artery as soon as the roentgenologist gives the ready signal. The arteriogram is taken during the process of injection (after 6.6 c.c. have been injected) and the phlebogram exposure is made 2 seconds later.

In the use of this substance by this method in a wide variety of intracranial and intracerebral conditions, the author has seen no bad effects, nor has there developed any hematoma or other evidence of harm to the injected artery. Some of the patients complain of facial pain during the injection; however, with a co-operative spirit and enough of the drug any incidental discomfort is always tolerated tranquilly. The greater portion of the article is taken up with the production of photographs portraying the wide variety of intracranial conditions demonstrated by this method. JOHN W. BRENNAN, M.D.

Penetrating Wounds of the Cerebral Ventricles. HENRY G. SCHWARTZ and GEORGE E. ROULHAC. *Ann. Surg.*, 1948, 127: 58.

The author reports an analysis of 50 consecutive cases of head injury with penetrating wounds of the cerebral ventricles. There was a 30 per cent mortality (15 cases) which could be assigned to two factors: infection (60%) and vital brain damage (40%). These cases were verified either at the time of surgery by direct vision, or at autopsy.

Thirteen patients were operated upon primarily at an average time of 39 hours after injury. The 4 deaths in this series were all due to vital brain damage. Although infection developed in 2 cases, the condition cleared up with adequate surgery. Thirty-six patients were operated upon at forward installations at an average time interval of 15 hours. Thirty-one of these required further surgery—for abscesses in 12 patients, meningitis in 3, and ventriculitis and meningitis in 14. Of the 10 deaths in this series, 9 occurred as the result of infection.

The three main factors which enter into the higher mortality of penetrating wounds of the cerebral ventricles are as follows:

1. Introduction of infection with resultant ventriculitis. Incomplete débridement is probably the most important fault.

2. Hemorrhage into the ventricular system. This was not a common finding in the series; however, when present, it is necessary to remove the clot under direct vision and to verify hemostasis.

3. Injury to vital centers. This group is not amenable to surgical therapy.

Although the treatment is not different from that used in other types of cerebral wounds, it is emphasized that "adequate, aggressive débridement of the entire tract, including the ventricles," be performed under direct vision. This applies also to secondary cases with abscess or ventriculitis. Chemotherapy and antibiotic therapy was used in various combinations in all cases but they are effective only when combined with the necessary surgery.

JACK I. WOOLF, M.D.

The Treatment of Open and Closed Craniocerebral Injuries (Le traitement des traumatismes cranio-cérébraux ouverts et fermés). WILLIAM JUNET. *Helvet. chir. acta*, 1947, 14: 274.

This article from the surgical clinic of the University of Geneva represents the views of the majority of neurological surgeons on head injuries. It is more an abstract of the literature than an experience of the author. As he states, the cases are limited, but they have been well followed up. There are a few case reports to illustrate the problem and the discussion.

The author discusses briefly and concisely all forms of open and closed head injuries and mentions the opinions of various authorities on these matters. He states that he has considerable difficulty in understanding the conception of concussion or commotio cerebri, but declares that of 1,055 cases of head injuries observed at the Clinic for a period of 10 years, 527 were commotio cerebri with cure in 87 per cent. Contusion of the brain is discussed with reference to the fact that there is a 10 per cent margin of safety for the brain within the cranial cavity. If the intracerebral contents expand beyond 10 per

cent serious compression will occur, because the brain is anchored within the cranial cavity. The 10 per cent augmentation of the volume of the brain interferes with venous drainage with a hypersecretion of spinal fluid which then becomes a vicious circle. Of the 1,055 cases, 359 were contusions with cures in 61 per cent and a mortality of 8.6 per cent. Among the suggestions made in the discussion of contusions is that of removing the contused tissue by operation. However, the author goes on to say that edema is probably the most important factor. The semisitting position is stressed in the treatment of these cases. The question of extradural hemorrhage is discussed briefly, and arteriography is suggested for localization of intercranial hematomas. Mention is made of acute external hydrocephalus.

Open wounds of the brain are mentioned, and the conclusions reached with regard to treatment differed very little from those that are commonly now accepted in this country. The skin must be closed over the defect at all costs, with a local application of sulfanilamides and penicillin in cases of primary closure. It is pointed out that it is more important to take the patient to centers where there is special equipment than to turn a general hospital into an ineffective and modified neurosurgical clearing station. The experiences of the British in this matter are discussed. Apparently in Switzerland they are less disturbed when penicillin passes the spinal fluid barrier than we are in this country. The question of dealing with fractures through the accessory sinuses is discussed, and apparently operation has not been required in the cases seen at this clinic. Finally, the postoperative care of the patient is mentioned with reference to the time at which he should become ambulatory. There seems to be a tendency to keep the patient in bed from 12 to 25 days. The rehabilitation of head injuries is emphasized, for it is believed that a useful person should be returned to society, not an invalid. The bibliography, especially with reference to European authors, is extensive.

ADRIEN VER BRUGGHEN, M.D.

Cerebral Granuloma. TUNG-HO CHANG, GEORGE W. SMITH, F. REGIS RIESENMAN, AND EDWIN F. ALSTON. *J. Am. M. Ass.*, 1948, 136: 230.

The authors present 4 cases of cerebral granuloma caused by Schistosoma japonicum eggs which were verified at operation. All patients presented similar neurologic signs and symptoms which pointed to an intracranial space-occupying lesion. In 3 of the patients the granuloma was located in the left hemisphere and produced right-sided hemipareses, jacksonian convulsions, and speech disturbances. Only one patient showed obvious signs of increased intracranial pressure. Air studies confirmed the diagnosis of intracranial tumor in each case. In 2 of the patients a slight increase in the blood eosinophils (6 and 12%) was reported, together with a slight increase in the spinal fluid lymphocytes. The pathologic examination of the tissue removed at operation revealed numerous pseudotubercles which contained in their center nests of eggs of Schistosoma japonicum and giant cells. They were walled off by dense collagenous fibrous tissue and a zone of diffuse lymphocytic infiltration. The patients were given stibophen postoperatively and showed continuous but slow improvement in their condition.

These patients had all seen service in the South Pacific or the Philippine Islands, but none gave a history relative to an acute phase of schistosomiasis prior to the development of cerebral symptoms. The authors outline the life cycle of schistosoma, review their classification, and the differential diagnosis of their species on the basis of the appearance and size of the eggs and the geographical foci of infection. They discuss also the symptoms produced by the three clinical stages of infection in man. They believe that the cerebral symptoms are the result of the reaction produced by the deposit of eggs which reaches the brain after passing through the vertebral venous system or the accessory portal circulation.

The literature on cerebral schistosomiasis and its medical and surgical treatment is reviewed and the authors recommend craniotomy as an adjuvant to the medical treatment when there is evidence of a localized expanding lesion. Cerebral schistosomiasis may appear clinically several months, or even several years, after the primary invasion by the larval form. The disease seems to be far more common than previously suspected. A history of early systemic schistosomiasis is not necessary for the diagnosis of the cerebral form, which should be suspected if the patient has been exposed to the disease in regions in which it is endemic. GEORGE PERRET, M.D.

Contribution to the Study of Intradural Cystic Neurinomas (Contributo allo studio del neurinoma cistico intradurale). EUGENIO PATELLANI. *Chirurgia*, 1947, 2: 218.

A subdural cystic neurinoma of the spinal cord in a 39 year old woman was studied by the author histologically. The tumor was located at the level of the eleventh dorsal vertebra and produced an incomplete block of the subarachnoid space. The tumor was successfully removed and the patient recovered.

The tumor was encapsulated and highly vascular. In addition to fibrocellular areas there were afibrillary cells of immature character. From the histomorphologic point of view the dual composition of the tumor and the staining properties of the fibrillary portion justified the diagnosis of neurinoma of the Verocay-Antoni type, or neurofibroma or perineural fibroblastoma of the Mallory-Penfield type. The mesenchymal histogenesis of the tumor could thus be established.

The formation of cavities or lacunae is ascribed by the author to edematous imbibition of the immature cellular formations caused by a sudden increase of pressure of the cerebrospinal fluid and also by necrosis of the intercystic septa. The last mentioned proc-

ess, conditioned by vascular disturbances, probably was responsible for hemorrhages within the cavities.

A rapid increase of the size of the tumor undoubtedly was responsible for the neurologic syndrome of irritation and compression.

JOSEPH K. NARAT, M.D.

The Treatment of Facial Paralysis by Tantalum Wire Suspension—Preliminary Report. LOUIS W. SCHULTZ and EDSON FAIRBROTHER FOWLER. *Plast. Reconstr. Surg.*, 1947, 2: 538.

A preliminary report of a modification of Schussler's tantalum wire suspension technique employing sheet tantalum saddle, and the authors' technique with tantalum gauze is presented as another addition to the surgery of facial paralysis and to the use of tantalum in plastic surgery.

Various methods employed in the surgical correction of facial paralysis by Busch, Momberg, Stein, Blair, Gillies, and Schussler, with the use of wire of several varieties, fascia, and fascial slings, are briefly reviewed with particular emphasis on the disadvantages of each in comparison to Schussler's method. The last technique has certain faults which the authors believe they have overcome with the use of tantalum gauze.

The surgical technique of an operation performed in two stages is described. In the first stage, a pattern of tantalum gauze is set in the affected cheek and entirely across both lips. Fibrous bands growing through the gauze mesh firmly fix these parts. In about 2 months, the second stage of the operation is performed. This consists of suspension, by means of tantalum wire, of the tantalum gauze fibrous tissue. The wire is placed through the superior margin of the gauze in the cheek and connected with a tantalum gauze sheet fixed to the temporal fascia by tantalum wire. The postoperative care is described.

A series of 3 cases is presented with before and after pictures and one roentgenogram showing the tantalum gauze and wire in position postoperatively.

EARL H. KLABUNDE, M.D.

SPINAL CORD AND ITS COVERINGS

Pseudohypertrophic Sclerosis of the Yellow Ligaments, a Cause of Compression of the Cauda Equina (Sclerosi pseudo-ipertrofica dei legamenti gialli causa di compressione della coda equina). CARLO PAIS. *Chir. org. movim.*, 1946, 30: 261.

In this article, cases of pressure on the cauda equina resulting from pseudohypertrophic sclerosis of the yellow ligaments are reviewed. In addition, the author reports 2 cases, proved at operation and by subsequent histological examination of the tissues removed at the time of operation, which were observed during a series of 100 laminectomies performed for various reasons at the Rizzoli Institute of Bologna.

At the time that this article was accepted for publication, June 27, 1944, the author could collect only 52 similar cases, 43 of which had been reported by North American authors and only 9 reported by European authors, none of the latter in Italy.

After presenting his 2 cases, the author discusses at length the anatomy, histology, and physiology of the yellow ligaments, and the etiology, concomitant lesions, anatomopathological picture, pathogenesis, subjective and objective symptoms, diagnostic signs, and treatment of this condition.

The first case reported by the author was that of a 40 year old male, who entered the hospital on August 28, 1940, complaining of backache of several years' duration. Following a motorcycle accident on April 21, 1927, he had suffered constant lancinating pains in the lumbar region and was unable to bend or straighten his trunk. This painful contraction of his trunk was severe and caused him to remain in bed for a week. Following the application of heat, the pain gradually diminished and he was able to return to work. During the next 12 years, he experienced three similar attacks of lumbar pain without apparent cause, each attack lasting about one week and being relieved by the application of heat and rest in bed. In the interim between attacks, the patient was bothered by constant weakness of the lumbar spine and pains of varying intensity upon even slight exertion. Spinal movements were limited.

August 15, 1938 the patient experienced another attack, which was not relieved by rest in bed, application of heat, or the wearing of supporting girdles and corsets. The pain finally became localized over an area the size of the palm of the hand in the right paravertebral space at the level of the first sacral vertebra. Bladder and sexual functions were normal.

Physical examination revealed an athletic type of person with a very noticeable rigidity of the lumbar spine accompanied by a physiological lordosis. Pain was experienced on pressure over the right paravertebral space at the level of the first sacral vertebra and the right sacroiliac joint. Sitting and erect postures were painful, but most pain was experienced when the patient was in a horizontal position.

Neurological examination revealed no motor disturbances. There was hyposensitivity to heat in the skin of the fifth lumbar and first sacral segments on both sides. The left knee jerk was absent and the left Achilles reflex was hypoactive. Other reflexes were normal. Jugular pressure, cough, and deep inspiration provoked slight lumbar pain. There was no muscular atrophy.

Roentgenography of the spine revealed diffuse calcification of the lumbar spine; the articular apophyses were owl-beaked and the space between the fourth and fifth lumbar vertebrae was narrowed.

Spinal puncture revealed normal fluid under normal pressure.

A myelogram, after the injection of lipiodol solution, revealed a descent of the opaque fluid to the normal distal limit with fragmentation of the opaque shadow at the levels of the last three lumbar vertebrae. With the patient in the Trendelenburg position there was a filling defect at the level of the fourth lumbar vertebra.

Laminectomy was performed on September 12, 1940 under local anesthesia. The yellow ligaments at the level of the fifth lumbar vertebra were found tenaciously adherent to the dura and so abnormally thickened that it appeared as if they were a separate tube.

Postoperative convalescence was normal and postoperative results were satisfactory.

Histological examination of the yellow ligaments removed at operation showed a 12 mm. thickening, and the ligaments were composed chiefly of dense fibrous tissue and collagen fibers. Elastic fibers were sparse and diffuse. Many blood vessels had been obliterated. Large hyaline and calcareous deposits were scattered throughout the connective tissue. A histological diagnosis of pseudohypertrophic sclerosis of the yellow ligaments was made.

The second case reported by the author was that of a 48 year old male, who entered the hospital on August 4, 1941 with a past history of sciatica on the left side at 25 years of age, without any relation to injury, which was cured after a few weeks of medical treatment. Fifteen months before entry, without apparent cause, the patient began to notice lumbar pain with radiation to the left buttock. Eight months before entry the pain had spread to the whole left lower extremity. The pain was accentuated by lateral and anterior movements of the spine, and by the supine position. Six months before entry, extension of the left knee became limited and a month later motor weakness of the entire left lower extremity developed.

Physiotherapy, x-ray therapy, and local injections of various kinds had no effect on the disease.

Physical examination revealed a well developed adult male with rigidity of the lumbar spine and a slight deviation of the spine to the right, the convexity of the curve being to the left. There was pain on palpation with radiation of the pain to the left sciatic nerve. There was atrophy of the left lower extremity.

Neurological examination revealed, in addition to the motor weakness, tactile and thermal hypesthesia of the anterolateral aspect of the left leg and foot. Reflexes were normal except that the left Achilles reflex was sluggish and the left plantar reflex was absent.

X-ray examination revealed sacralization of the fifth lumbar vertebra and lumbarization of the twelfth dorsal vertebra.

There was a reaction of degeneration of the muscles supplied by the nerves from the fourth and fifth lumbar roots. No electrical conduction occurred through these nerves.

Lumbar puncture showed normal fluid under normal pressure.

The myelogram, after lipiodol injection, showed a defect of the opaque medium at the last lumbar interspace, and with the patient in the Trendelenburg position there was a partial block between the fourth and fifth lumbar and the fifth lumbar and the first sacral vertebrae.

Laminectomy of the fourth and the fifth lumbar vertebrae under local anesthesia revealed a thickened yellow ligament with stenosis of the dura in the lumbosacral region. There was no herniation of the discs. The thickened ligament was removed to relieve pressure on the nerve bundles.

Postoperative recovery was uneventful and the lumbar and sciatic pain disappeared in a month. There was residual rigidity of the spine and permanent paralysis of the small sciatic, peroneal, and anterior tibial nerves.

Histological examination of the specimen of yellow ligament removed at operation showed a thickness of 8 mm. The ligament was composed of fibrous tissue and irregular collagen fibers with sparse elastic fibers, hyaline degeneration, and obliterated blood vessels. Diagnosis of pseudohypertrophic sclerosis of the yellow ligaments was made.

After a lengthy discussion of the anatomy of the yellow ligaments, the author concludes that the interlaminar portion of the yellow ligaments with the nerve roots is situated within the dura and is bathed in the spinal fluid; while the interpeduncular portion with the ganglia is covered by the dura, but not by the arachnoid, and therefore it is not in contact with the spinal fluid. Eventual hypertrophy of the yellow ligaments can compress contemporaneously one or more bundles of the cauda equina or isolate a ganglion and cause a change in the spinal fluid to some degree.

The yellow ligaments have a characteristic color because they are made up almost entirely of elastic tissue, differing from other ligaments in this respect. The elastic fibers, from 5 to 6 micra in size, appear in closely packed bundles. They lie chiefly in a vertical plane in the interlaminar portion and in an oblique plane in the interpeduncular portion; but the fibers intersect transversely. Collagen fibers are sparse and the blood vessels are imbedded in the small amount of connective tissue that appears in the ligament.

The chief characteristic of the yellow ligaments is their elasticity. This characteristic enables the ligaments to perform an important part in stabilizing the vertebrae and aiding in the movements of the spine. When the nucleus pulposus, under tension, tends to separate the vertebral bodies, the elasticity of the yellow ligaments tends to bring together the laminae with the intervertebral articulations as a fulcrum. The nuclei pulposi of the intervertebral discs and the yellow ligaments have a synergistic action. When the spinal column is flexed, the nuclei pulposi are displaced posteriorly and the yellow ligaments extend vertically; when the spinal column is extended, the nuclei pulposi are displaced anteriorly and the yellow ligaments are drawn backward. In the lateral movements of the spine, the nuclei pulposi move slightly to the side of extension and the yellow ligaments of the same side stretch, while those of the opposite side contract. In twisting movements, the nuclei pulposi form a hinge and the yellow ligaments stretch obliquely and laterally;

thus they contribute to the restoration of the normal position of the spine after each movement.

The condition under consideration occurs in individuals from 16 to 57 years of age according to the cases reported, with the highest incidence in the fourth decade. It occurs more often in men than in women—in the ratio of 3 to 1. Both of the author's cases occurred in men in the fourth decade. The most common site of the hypertrophy is between the fourth and fifth lumbar and the fifth lumbar and the first sacral vertebrae. Hypertrophy most often occurs in the interlaminar portion with the syndrome of compression of the roots of the cauda equina, and less often in the interpeduncular portion. Indirect trauma is the determining factor in 75 per cent of the cases.

Concomitant lesions are herniation of the discs, eventual thickening of the laminae at the insertion of the hypertrophied ligaments, disintegration of the bodies of the vertebrae from fracture or neoplasm, and laceration of the yellow ligaments in cases of severe trauma.

The anatomopathological picture is one of atrophic sclerosis of the yellow ligaments with a stenosing action of the dural sac. The thickening of the ligament may vary from one to four times the normal thickness. Grossly, the ligament appears a brilliant white because of the substitution of the normal elastic tissue by connective tissue. It becomes tenaciously adherent to the dura, the epidural vessels are compressed, and the subsequent edema gives rise to a compression neuritis. Microscopically, the elastic fibers become disorganized and are later replaced by connective tissue. The blood vessels in the ligament become obliterated, hyaline and calcium deposits are laid down, and fatty degeneration is also present.

The first and most important symptom is acute lumbar pain following trauma in most cases, which persists and increases in severity; but in some cases, the pain diminishes only to be followed by more frequent and severer attacks of pain after the slightest trauma. As the disease progresses and pressure is exerted on the nerve bundles of the cauda equina, the pain becomes referred to progressively descending parts of the lower extremity. Signs of motor damage may appear later.

Neri's sign, that of lumbar and sciatic pain induced by forced flexion of the head on the thorax with the patient in the supine position can be elicited. Neri's sign is the most important sign of hypertrophy of the yellow ligaments, as well as of hernia of the discs. This sign is demonstrated when compression of the jugular vessels elicits pain in the lower back. When nerve involvement has occurred, the localized reaction of degeneration can be demonstrated. Heterological scoliosis with the convexity of the curve to the painful side often occurs. Painful contracture of the trunk and lower extremity with inability to completely extend the knee joint occurs when the pain is severe and long continued. Hypesthesia of the anal and sacral regions and of the anterolateral aspects of the leg and foot may occur. X-ray examination, following lipiodol injections into the subdural space, reveals deformities resulting from pressure of the hypertrophied ligaments, which causes partial or complete block.

Physiotherapy, x-ray therapy, and immobilization by means of corsets and braces are only of temporary benefit. Barring contraindications, relief is obtained from laminectomy with removal of the pressure of the hypertrophied ligaments on the nerve bundles of the cauda equina. The site of operation is determined by myelography after lipiodol injections. Local anesthesia is used in most cases.

Postoperative results are good and the subjective symptoms and objective signs disappear rapidly after surgical intervention.

BLACKWELL MARKHAM, M.D.

Spinal Extradural Cyst: Report of a Case, with Particular Reference to a Possible Diagnostic Aid. OSCAR A. TURNER. *Arch. Neur. Psychiat.*, Chic., 1947, 58: 593.

The author reports a case of spinal extradural cyst in an 11 year old boy, with progressive loss of power in the lower extremities over a period of 5 months. A spastic paraplegia was present with a sensory level at the ninth thoracic segment. Roentgenograms revealed enlargement of the vertebral canal, chiefly in the region of the seventh and eighth thoracic vertebrae. There were erosion and atrophy of the pedicles, and erosion of the posterior margins of the bodies of the affected vertebrae.

Spinal puncture revealed evidence of a complete block with xanthochromic fluid. After withdrawal of 4 c.c. of fluid, improvement in motor function of the legs was noted an hour and a half later.

At operation, a large extradural cyst was removed, which showed direct communication with the subarachnoid system through a small defect in the dura.

Pathological study revealed the wall of the cyst to be composed of a double layer of rather heavy collagenous tissue, which was partly hyalinized. Between the inner and outer connective tissue layers forming the wall of the cyst was a layer of tissue formed either by a bank of cuboidal or flattened cells, or by a mesh of elongated and stellate cells with interlacing processes.

The author believes that this represents a case of extradural spinal cyst associated with early roentgenologic manifestations of kyphosis dorsalis juvenilis and erosion of the pedicles.

He points out that the improvement in function of the lower extremities resulted from partial evacuation of the cyst, because of its communication with the subarachnoid system, and that this may be a useful sign diagnostically.

Anatomic evidence has been presented to show that the origin of the cyst is a herniation of the pia arachnoid through the dura, and chemical analysis of the fluids in the cyst and in the subarachnoid space would indicate that the fluids are identical.

HOWARD A. BROWN, M.D.

PERIPHERAL NERVES

The Problem of Surgical Therapy in Lesions of the Peripheral Nerves (Il problema della terapia chirurgica nelle lesioni dei nervi periferici). E. Miserocchi and U. Sacchi. *Chirurgia*, 1946, 1: 407.

It was noted that in late operations, that is, any time after 2 months from the time of injury, the time required for recovery is about the same as when it is done earlier. For injuries to the tibial or peroneal nerves this ranges from 13 to 15 months.

To explain this phenomenon the theory is propounded that the regenerative process after a certain time must start from the trophic end of the cord and from thence advance down toward the point of injury at the rate of about 2 mm. per day, just as pointed out by Cajal and others. A graph is presented which shows that in the cases in which there was a failure of regeneration the operation had not been done up to the time that this slowly advancing regenerative process reached the point of interruption of the nerve. The authors believe, therefore, that the nerve can be operated upon too late. Of course, no definite period can be fixed for the operation of nerve suture; it will vary with the nerve injured, with the physical characteristics of the injured individual, and with the level at which the nerve injury is located. The nearer the injury to the trophic center in the cord, and the more proximal its location, the earlier the operation must be done.

By observation of these limitations the operation of nerve suture can generally be expected to produce satisfactory results as far as procuring a return of contractile power to the larger muscles. However, it has been abundantly demonstrated that the smaller muscles, such as those of the hands and feet, soon lose their capacity for regeneration, whether this be due to a disappearance of the motor end plates, or to early infiltration of connective tissue.

It would seem advisable to operate early on such nerves as the ulnar, peroneal, or tibial in order to give them the chance to start regenerating from the point of injury, instead of from the trophic center. Therefore, the authors divide their cases into 2 groups: (1) those suitable for early suture of the nerves supplying small muscle groups, and (2) those in which suture should be done after the second month when the process of regeneration has failed to respond in the manner described for the early operative case.

John W. Brennan, M.D.

The Use of Autogenous Grafts for the Repair of Large Gaps in Peripheral Nerves. H. J. Seddon. *Brit. J. Surg.*, 1947, 35: 151.

Extensive loss of nerve tissue presents one of the most difficult problems in the repair of peripheral nerve injuries. In the author's series of 699 cases requiring operative repair, it was found that 8.6 per cent of the patients had lesions that were reparable only by the use of nerve grafts. Despite occasional case reports on the successful use of both heterogenous and homogenous grafts, it is the unequivocal opinion of the author that such grafts are not of the slightest use in clinical practice; hence, only the use of autogenous nerve grafts offers any hope for recovery in these cases.

The present report is based upon the results obtained in 58 cases in which nerve autografting had been performed. There are several technical considerations that must be borne in mind in treating such injuries. A basic factor that has received scant attention in the past is that the graft, or collection of grafts, must have a total cross section area at least equal to that of the peripheral nerve to be repaired. This should apply both at the proximal and distal portions since it is obvious that if the nerve graft is smaller at one end it is not likely that the entire number of regenerating nerve elements would be able to pass through the graft.

In the use of cutaneous nerves, one should ascertain that there are no bifurcations of the nerve during its course. Four specific cutaneous nerves were found to be of exceptional value. These are as follows: the internal cutaneous nerve of the forearm proximal to its bifurcation at the elbow, the superficial radial nerve, the sural nerve, and the saphenous (internal saphenous) nerve in the thigh. Although there have been theoretical objections to the use of cutaneous nerves in the repair of nerves in which motor fibers might be anticipated, these have been completely dispelled by the present series. A segment of the trunk of a main nerve may be used very satisfactorily when two large nerves are damaged and it is considered possible to repair only one. Although there is a definite risk in the use of large nerve grafts because of the possibility of ischemia with resulting collagenization, it is nevertheless a worth-while procedure. It is possible that Strange's pedicle grafting technique will prove the solution to this problem. Predegenerative grafts have also been advocated; however, the author is not completely satisfied with this theory.

The operative technique in nerve grafting of autogenous nerves is essentially similar to that for other nerve suture; however, there are several factors which require emphasis. In cases of severe cutaneous scarring it is usually advisable that the repair be made by plastic surgery with the use of full thickness flaps before performing the definite nerve repair. At this time it is usually possible to determine what type of nerve repair will be required. Mobilization of the nerve stumps may be carried out if the defect is so great that a sufficient supply of graft material may not be obtainable. However, in this case, it must be remembered that extreme flexion of the joint or marked stretching of the nerve is not advisable. Flexion of the knee or elbow beyond 90 degrees is considered hazardous. Resection of the end bulb should be carried out similarly to that in any other type of nerve repair. There is seldom any difficulty in resection of the proximal bulb since the existence of the neuroma itself is indicative of healthy axons. The distal nerve stump requires much more exten-

sive resection since collagenization may extend for a considerable distance. The bed for the graft should be in a healthy vascularized area. If there is extensive scarring, it is worth while to consider the bypass operation, in which case the nerve is either tunneled or placed through healthy tissue. Since it is now well recognized that grafts shrink, it is advisable to secure a graft at least 15 per cent longer than the gap to be closed. If at all possible, a graft from a distal stump should not be used, especially if injury has occurred more than 6 months previously.

The author stressed the need for a meticulous and precise technique in suturing of the nerve. Since the handling of cutaneous nerves is extremely tedious and hardly permits of satisfactory suturing with thread, the author prefers the use of the plasma clot fixation. He has not found the use of the molds, as devised by Tarlov, convenient. Instead, he builds up the surrounding area by the use of either bone wax or fibrin foam to make a small lake about the area to be sutured, and pours in the prepared plasma, following which the bone wax or fibrin is removed.

An evaluation of 52 of the 58 cases that had been followed sufficiently long to permit a fair assessment reveals that in 20 cases (38.5%), recovery was as good as that following end-to-end suture. Seven patients were showing satisfactory recovery although their end-result was not fully evaluated. Partial but useful recovery had occurred in another 8 cases, which made the operation of the autogenous nerve graft a valuable procedure in 67.3 per cent of the cases.

JACK I. WOOLF, M.D.

SYMPATHETIC NERVES

Sympathectomy for Obliterative Arterial Disease; Indications and Contraindications. NORMAN E. FREEMAN, FRANK H. LEEDS, and RICHARD E. GARDNER. *Ann. Surg.*, 1947, 126: 873.

It is well recognized that sympathectomy is useful in the treatment of peripheral vascular disease when associated with vasospasm and abnormal vasoconstriction. Although verification of the vasospastic elements by preoperative diagnostic tests is helpful, lasting and progressive improvement may be attained even when these tests fail to reveal satisfactory results. Since vasodilator tests may not allow sufficient time for maximum effect, great reliance has been placed upon the subjective improvement after such tests.

Clinical tests have been utilized by the authors in the selection of patients with intermittent claudication for sympathectomy, but they emphasize the importance of the presence of the following signs of abnormal vasoconstriction: (1) peripheral cyanosis, (2) increased sweating, and (3) constriction of superficial veins of the extremity. Delayed blanching on elevation of an extremity is also of significance. Whether this is due to venous constriction and concomitant arterial constriction remains theoretical.

A contraindication to sympathectomy that has failed to receive widespread recognition is advanced obliterative arterial disease. In such cases delayed gangrene may ensue. The authors discuss the cases of 4 patients who developed gangrene. The following frequent contraindications were noted: (1) pain due to ischemic neuritis, (2) rapid blanching on elevation, (3) absent oscillations at the ankle, and (4) atrophy of soft tissues.

The unusual site of the gangrene (on the dorsum of the foot) is somewhat similar to that following proximal ligation of a major artery in the presence of an arteriovenous fistula. In this case there is a precipitous drop in the pressure due to a greatly expanded vascular bed on the venous side. In advanced obliterative vascular disease the major arteries are already blocked; hence, destroying the vasomotor tone of the arteriovenous anastomoses permits the blood to be abruptly shunted into the venous system.

JACK I. WOOLF, M.D.

An Anatomic Evaluation of Operations for Hypertension. G. A. G. MITCHELL. *Edinburgh M. J.*, 1947, 54: 545.

In view of the increasing evidence of the value of sympathectomy in the treatment of hypertension and because of the widespread variance and extent of the operation as it is being performed, the author believes that its evaluation on anatomic grounds is indicated at the present time. In order to make this evaluation, however, it is necessary to determine what effects are desired. The consensus of the various authorities who have performed the greater number of these operations is that the attempt should be made (1) to produce widespread vasodilatation of the greater part of the abdominal splanchnic area, (2) to denervate the vessels of the lower limbs in order to produce somatic dilatation in these parts, (3) to denervate the kidneys in order to intercept possible reflex vasoconstrictor impulses, and (4) to denervate the suprarenal glands, to diminish the secretion of adrenaline and to prevent vasoconstriction of the suprarenal vessels.

There are certain basic requirements or factors which must be kept in mind when considering the type of operation that is necessary to produce the afore described effects, since they may also influence the type of operation or procedure selected. First of all, the operation must carry a minimal risk to life, which is consistent with the production of the desired results. It should also produce as few undesirable sequelae as possible. It should be sufficiently extensive to prevent nerve regeneration and should be preganglionic rather than postganglionic in type. The incision for the operation should allow exploration of the renal, suprarenal, and paravertebral areas in order to rule out the possibility of associated tumors in these regions which may be a possible cause of the hypertension.

The variability of the peripheral distribution of the sympathetic nerves must influence the extent of the operative procedure since it has been shown that the

escape of only a small proportion of the nerve fibers supplying certain viscera or vessels may produce effects entirely disproportionate to their numbers.

Fifty-four dissections were performed. In 8 specimens, nerve rootlets of the greater splanchnic nerves arose at a level as high as the fourth thoracic ganglia, and in one case, as high as the third thoracic ganglia. Many of the upper rootlets supply the aortic and esophageal filaments and some of these may pass downward to the abdomen along the aorta and hence escape in the ordinary thoracodorsal sympathectomy. In approximately 10 per cent of the dissections a para-aortic nerve was seen. Occasionally this nerve had upper fibers arising as high as the fourth or fifth thoracic ganglia.

The author suggests that the optimum sympathectomy required for the treatment of hypertension should be a bilateral resection of the sympathetic trunks from the fourth ganglia to the third lumbar ganglia with removal of all the splanchnic nerves, since only an operation of this magnitude will satisfactorily denervate the desired areas or those considered necessary by the majority of investigators. Nevertheless, it is realized that even an operation of this extent may allow the escape of certain sympathetic nerve filaments. JACK I. WOOLF, M.D.

MISCELLANEOUS

Post-Traumatic Osteoporosis Algica, or the Syndrome of Sudeck, Treated by Novocainization of the Stellate Ganglion (Osteoporosis álgica postraumática o sindrome de Sudeck, tratada por novocainización del ganglio estelar). ISIDORO PASCAU. *Cir. ortop. traumat.*, Habana, 1946, 13: 3.

One hundred and thirty-three cases of Sudeck's syndrome are reported. Of these 93 (70%) resulted from a Colles fracture; the rest represented various fractures of the bones of the forearm, wrist, and hand; 4 were displaced fractures of the surgical neck of the humerus; and 1 was a partial and another a total avulsion of the greater tuberosity of the humerus. The last was accompanied by dislocation of the shoulder joint which had remained unreduced for 48 hours following the injury. The remaining cases were instances of woundings and infections.

Treatment consisted exclusively of novocainization of the stellate ganglion by the technique described by Debakey-Ochsner, with a slight variation. By this method the ganglion was blocked once or twice a week, and a total average of 12 injections was given. Of course, preventive measures, especially in these fracture cases, should be carried out. In any case of fracture in which the fingers become cyanotic, seem to be losing mobility and flexibility, or in which edema appears, the cast should be loosened or the hand freed; especially in the Colles fracture, the extremity should be elevated, and active exercises, such as the crinkling together of a silk handkerchief or the squeezing of a partially inflated rubber ball, should be initiated.

However, when the syndrome is definitely established the author uses only the method of novocainization of the stellate ganglion in the neck and then stimulates active movements. For the latter purpose he uses a special stimulus to muscular recovery in the guise of ionization treatments with mecholyl or another acetylcholin derivative. The pain and muscular debility disappear sooner than the roentgenographic changes in the bones.

The author believes that the novocainization method is equal to, or better than, excision of the stellate ganglion as it does not leave a lasting Horner's syndrome in its wake. No deaths and no serious complications have been observed with this method. The only troubles noted were a slight transitory aphonia, nausea, dizziness and some sensation of oppression in the chest. JOHN W. BRENNAN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Malignant Myoblastoma of the Mammary Gland (Sul mioblastoma maligno della mammella). VITO LORIZIO. *Gior. ital. chir.*, 1947, 3: 486.

A 36 year old woman noted a small tumor in the upper outer quadrant of her left breast 6 months before she presented herself. When first seen the mass was the size of a large orange; it was covered by a tensely taut skin which could not be raised in folds, and showed a moderate amount of venous marmoration. The neoplasm was of a densely elastic consistency, and was not painful to palpation; it could not be displaced on the underlying tissues. The breast itself was freely movable. A diagnosis of adenocarcinoma was made and the breast and axillary lymph glands were removed en bloc. One year later the new growth had recurred in the guise of a slightly mobile, dense, hazelnut-sized tumefaction in the healed scar of the original operation. The recurrent mass regressed under the application of roentgen therapy.

Histologic examination disclosed, even under low power of the microscope, a cell-rich parenchyma with meager connective tissue stroma extending in a diffuse manner among the tumor cells. These cells varied greatly in size and shape and in their number of nuclei. There were numerous small, rounded, fusiform cells disposed in featureless masses or tending to arrange themselves in what resembled bundles reminiscent of bundles of muscle cells. Even in these smaller cells there was evidence in places of longitudinal striation. The larger cells were often giants, even larger than the Langhans cells of tuberculous granulomatous tissue. These huge cells had usually more than one nucleus (from 2 to 15). The nuclei varied in size, in position in the cytoplasm of the cell, in their content of chromatine (usually in excess), and in the number of nucleoli. The polymorphism of these cells defies detailed description; however, there were numerous square forms or forms drawn out in bandlike structures with a thick cell membrane along the longer side, the shorter side being practically without cell membrane, as though it were broken off abruptly. The voluminous cytoplasm in these cells was definitely eosinophile and there was vague or definite evidence in the cytoplasm of longitudinal striation. There were ribbonlike bands resembling the cytoplasm of the aforedescribed giant cells, but without nuclei. When nuclei were present, they were usually elongated and disposed along the periphery of the cell, as a rule along the longer side and frequently on alternating sides. There were also huge cells of rounded shape or in the shape of a palette, that is, with a rectangular or bandlike process extending from the main cell mass. These processes never contained nuclei but were especially rich in longitudinal striations. With a stain of sierra-orange these giant cells were found to be particularly rich in salts of potassium. The lymph glands from the axilla gave no histologic evidence of metastasis.

This tumor is considered a malignant myoblastoma in accordance with the classification given in Tonelli's recent study of this subject (*Arch. Vecchi*, 1943, vol. 595). JOHN W. BRENNAN, M.D.

Testosterone in the Treatment of Breast Carcinomas. FRANK E. ADAIR. *Med. Clin. N. America*, 1948, 32: 18.

The author prefaces his article with a discussion of the literature on the treatment of cancer of the breast with androgens. The first reports of cases in which this method of treatment was used were presented in 1939, by Loesser. Ulrich, Farrow, and Woodard, and Fels, Prudente, and Bolger followed with reports of varying success in the treatment of carcinoma of the breast with this substance.

Testosterone has been used in many forms. The propionate and acetate forms are administered intramuscularly, crystalline pellets by subcutaneous implantation, and methyl testosterone is given orally.

Loesser suggests the possibility of forestalling the reappearance of cancer in patients in whom all known breast neoplasm has been eliminated. He cites one case in which no beneficial effect from the testosterone was obtained, but it seemed to influence the eventual favorable response to roentgen therapy. The adverse effects are limited to hypercalcemia.

The present report is based on the author's experience with testosterone therapy in 450 cases of carcinoma of the breast. Following the implantation of 300 mgm. of testosterone there resulted skipped menstrual periods, hirsutism, deepening and huskiness of the voice, an increase in sexual desire, and acne. Besides this virilizing effect and the improvement in general health, testosterone exerts a direct and an indirect effect on cancerous tissue. There may be a diminution in size of the primary or metastatic tumors. In bone metastases, the improvement may be direct or indirect because of sclerosis at the site of the metastasis or in the osseous system as a whole.

Instances of improvement are much more common and striking in bone metastases than in soft tissue recurrences. Following testosterone therapy the entire osseous system becomes more dense; the local areas of destruction often fill in with bone salts with frequent restoration of trabeculae and contour. These changes have been observed in the roentgenogram. While local lesions may undergo complete repair, other bony lesions may not be influenced and may continue to increase. Two cases are reported in which patients with bone metastases obtained relief for a period of 2 years.

The author believes that we now have an agent that is capable of prolonging the life of the patient,

in fairly good condition for 2 years at least. With further experience in the use of hormone therapy, palliation may be obtained for a longer period of time. Usually, the patient begins to feel relief of pain after from 2 to 3 weeks of hormone medication. The author presents the case of a patient with abdominal metastases who showed remarkable response to testosterone therapy. Little improvement in liver and chest metastases has been observed.

The author favors a plan of dosage whereby the patient receives 100 mgm. of testosterone propionate intramuscularly three times a week for a period of 10 weeks, following which a maintenance dose of 40 to 60 mgm. daily of methyl testosterone, by mouth, is given for 8 weeks. Enough hormone to inhibit estrogenic action should be given; this amount remains to be established.

There are no contraindications to testosterone therapy in patients with advanced cancer of the breast. In general, the results which may be anticipated following androgen therapy are: relief of pain, removal of disability, increased appetite, weight gain, ability to sleep without the aid of narcotics, delay in the normal growth processes of metastatic cancer, and a feeling of well being. Even though the results are frequently disappointing, it is believed that the influence of testosterone on mammary carcinoma is so striking that clinical and metabolic studies should be pursued with vigor.

ROBERT R. BIGELOW, M.D.

The Relationship Between the Stage of Tumor Development and Age in Determining the Prognosis of Breast Cancer (Die Abhaengigkeit der Prognose der Mamma-Carcinome vom Tumorstadium und vom Lebensalter anhand von 702 Faellen). H. R. SCHINZ and CH. BOTSZTEJN. *Acta radiol.*, Stockh., 1947, 28: 611.

Of 1,033 malignant lesions of the breast seen at the Institute of Radiation Therapy in Zurich between 1919 and 1945, 702 have been carefully classified according to the classification of Schinz and Steinthal. These have been related to the ages of the patients, and several facts are brought to light. In the authors' experience, younger women presented themselves more frequently in the early stages of the disease, while older women more frequently presented themselves with wholly inoperable lesions. In the younger women small tumors appeared to give rise to metastasis earlier than in older women. The cases of advanced local lesions with no metastasis occurred almost exclusively in older women.

In a small number of patients, almost all older women, there was a tremendous local infiltration without any metastasis and with a relatively very good prognosis. However, when the same stages of tumor development are compared, the results are identical in the older and in the younger women. By a careful classification, on a purely clinical basis, it was possible to estimate the chances of cure within from 10 to 20 per cent. WILLIAM C. BECK, M.D.

Follow-Up Examination of 103 Cases of Cancer of the Breast with the Purpose of Evaluating Preoperative and Postoperative Irradiation Therapy (Examen ultérieur de 103 cas de cancer du sein en vue de l'appréciation de la radiothérapie pré- et post-opératoire). M. ANDREASSEN. *Lyon chir.*, 1947, 42: 702.

This material originating from the surgical clinic of Dahl-Iversen in Copenhagen, Denmark, is divided into three parts according to the method of classification by Steinthal; the first consisting of 29 patients with a small nonadherent primary tumor and absence of metastases in the axillary lymph glands; the second of 42 patients with a moderately sized tumor and invasion of the axilla; and the third of 32 patients with a large, rapidly growing tumor adherent to the skin or underlying muscle, or to both, and with metastases in the axillary lymph glands.

All of the patients were given postoperative irradiation treatment and every other one was given preoperative roentgen therapy in addition. Preoperative treatment consisted of 3,000 roentgens given through 3 portals and in 3 weeks' time. The patients were operated upon after 4 weeks. The postoperative therapy was started about 2 weeks after the operation and again consisted of 1,000 roentgens per portal for a total of 3,000 roentgens.

The material was rechecked 3 years after operation and again after 5 years. In the period between the third year and the fifth year recurrences developed in 15 per cent, which showed that the period of observation of 3 years is not long enough to postulate a cure. Of the original material of 103 patients, all were living at the end of 5 years except 4. These apparently did not die of their cancer. Of the 99 remaining patients 38 per cent did not show any evidence of recurrence at the end of 5 years. However, there were only 3 recurrences in group 1, 28 in group 2, and 30 in group 3.

The great importance of the invasion of the axillary lymph glands is emphasized. Of the 29 patients in whom these glands were not involved, 24 (80 per cent) remained without recurrence, while among the remaining 70 there were only 14 (19 per cent) who were free from recurrence at the end of 5 years. Another important observation on this material is that 21 per cent of the recurrences took place in the supraclavicular lymph glands; this argues for extension of the operative field in cases of this type.

No definite evidence could be obtained from this material that the results to be expected from combined preoperative and postoperative irradiation therapy are any better than those from postoperative therapy alone. JOHN W. BRENNAN, M.D.

TRACHEA, LUNGS, AND PLEURA

Surgical Aspects of Bronchiectasis. JOHN W. STRIEDER. *N. England J. M.*, 1948, 238: 109.

The definitive treatment of bronchiectasis is surgical excision of the involved segments if their total extent is not excessive.

The results of medical management are reviewed. On the basis of numerous series, medical treatment was found to be inadequate. A summary of the collected data on medically managed bronchiectasis indicated that less than 10 per cent of patients with severe bronchiectasis obtain a satisfactory result, and that the mortality in from 10 to 15 years after diagnosis is between 30 and 50 per cent.

The improved technique of pulmonary resection by individual treatment of the hilar structures, as well as the advent of such adjuncts as penicillin, has brought surgical treatment to a very safe level. Likewise, the refinement of segmental resection increases operability by conservation of useful lung. Operative mortality figures vary according to the circumstances involved, but are given at as low as 1 per cent. In bilateral bronchiectasis the risk is increased, not only because of multiple operations, but because convalescence from the first resection must take place in face of persistent contralateral disease.

The results of 93 operations on 72 patients on the author's service, which included multilobar as well as bilateral cases, indicated a 9.7 per cent case mortality rate and a 7.5 per cent operative mortality rate (deaths directly attributable to operations).

The nonsurgical measures include postural drainage and bronchoscopy. The latter is important in ruling out concomitant or complicating intrabronchial lesions. Penicillin, although very beneficial in improving the patient's condition in preparation for surgery, will not provide for permanency of results.

The more important complications of bronchiectasis, such as putrid empyema, extensions of infection, metastatic brain abscess, and hemorrhage, are elaborated upon.

This paper was given as part of a symposium on bronchiectasis before the Massachusetts Medical Society, Boston, and is a concise but comprehensive review of the subject. HIRAM T. LANGSTON, M.D.

Cystic Disease of the Lungs. WILLIAM L. ROGERS. *West. J. Surg.*, 1948, 56: 157.

The author reviews 6 cases of patients suffering from cystic disease of the lungs, all probably congenital in type. He presents certain criteria to assist in classifying the clinical cases.

Primary resection is advocated in most instances in which surgical intervention is indicated as the procedure of choice. However, the congenital type may present instances in which palliative decompression and drainage or multiple stage operations would be desirable. The paper is well illustrated.
STEPHEN A. ZIEMAN, M.D.

Studies in Lung Abscess. Anaerobic (Fetid) Lung Abscess. Aerobic (Nonfetid) Lung Abscess. R. C. BROCK. *Guy's Hosp. Rep.*, Lond., 1947, 96: 97; 125.

Brock discusses anaerobic and aerobic lung abscesses. He stresses the fact that the expectoration of pus, whether offensive or not, is important to the diagnosis of lung abscess. Lung abscess is regarded as a clinicopathologic condition due to many different causes and processes. It is not an entity in itself.

Primary anaerobic (fetid) abscess is essentially an acute suppurative pneumonitis proceeding to a greater or lesser degree of gangrene and is characterized by a peculiar, penetrating, and exceedingly offensive smell. The smell arises from an anaerobic infection, often mixed, which both causes the gangrene and flourishes on the dead tissue.

It is probable that the varied combination of spirochetes, fusiform bacilli, streptococci, and other micro-organisms can cause anaerobic or fetid lung abscess in favorable circumstances, and it may be that as yet unrecognized organisms, particularly anaerobic streptococci, are involved. Certainly actinomyces may be present and may be the only organism found in some cases of foul lung abscess.

The morbid anatomy considers acute fetid lung abscess (a) with formation of a slough, and (b) without formation of a slough; and chronic anaerobic pneumonitis complicated by or followed by new acute abscesses.

The clinical features show acute pulmonary gangrene and acute fetid lung abscess.

Secondary fetid abscess depends principally on an antecedent history of operation, dental sepsis, or the like. An infected lung cyst may mimic a fetid lung abscess. Bronchiectasis, intrapulmonary or intrabronchial foreign body, bronchial carcinoma or adenoma, and tuberculosis may introduce diagnostic difficulties. All these conditions may produce foul, smelly sputum which contains anaerobes.

Treatment includes operative drainage, but chemotherapy has achieved success without operation. The former should not be neglected because of the latter, but should be done when resolution is slow.

Aerobic lung abscess, in many cases, is almost identical with acute fetid lung abscess except for the absence of the fetid smell; it is typically segmental in origin and most of what has been said about the pathology of fetid lung abscess applies to it also, with the chief difference that a slough is not commonly found.

The fundamental process in the formation of a typical nonfetid abscess is generally a segmental pneumonitis due to bronchial embolism which proceeds to cavitation with the formation of a slough in very rare instances.

Primary aerobic lung abscess may be segmental or nonsegmental; the process may remain confined to one segment or skip to other segments of the lung. The clinical features differ little from those of the fetid type of abscess and the management of both types is similar. STEPHEN A. ZIEMAN, M.D.

The Rational Basis of Endobronchial Medical Treatment of Lung Abscess (Bases rationnelles du traitement médical endo-bronchique des abscès du poumon). MAX FOURESTIER and YVES LE BOUCHER. *Presse méd.*, 1947, 55: 822.

Ten cases of pulmonary abscess were treated either with penicillin alone or with a combination of peni-

cillin and sulfonamide instilled endobronchially. The result was excellent in all cases.

Before the treatment is started, bronchoscopy is done and the bacteriology of the pus is examined. If gram-positive organisms only are found, penicillin alone is used. If gram-negative bacteria are present as well, sulfonamide is used in addition to penicillin. A dose of 400,000 units of penicillin is instilled endobronchially through a Metras tube three times weekly after previous anesthetization of the area with 0.5 per cent pantocain solution. In cases of mixed infection 1 gm. of a water soluble sulfonamide is added to the instilled penicillin. In addition to the local treatment, penicillin alone or penicillin plus some sulfonamide is given intramuscularly, in the amount of 1,000,000 units of penicillin and 5 gm. of sulfonamide daily.

This treatment had to be continued for from 1 to 2 months until all signs and symptoms of the abscess had disappeared. WERNER M. SOLMITZ, M.D.

Mucoid (Gelatinous) Lung Cancer Characterized by Pronounced Bronchorrhea (Cáncer gelatinoso del pulmón de forma broncorreica). JUAN CARLOS REY and PEDRO RUBINSTEIN. *An. Cáted. pat. clin. tuberc.*, 1946, 8: 334.

This report concerns a man, aged 62, who was seen in July, 1945. In July, 1944 he had suffered from a respiratory infection which was considered to be pneumonia on the right side. This was followed by a rather prolonged convalescence, but he remained well thereafter until March, 1945, when the previous small amount of mucopurulent sputum began to increase in volume, reaching 1,500 c.c. on some days. The expectorated material was transparent, thick, and slightly frothy. He had lost 3 kgm. in weight over a 4 month period.

Studies after admission showed no fever, and no cardiovascular disease could be recognized. Urine and serologic examinations were negative.

X-ray examination revealed an opacity in the right lower chest, conforming to the middle lobe distribution. Evidence of nodular infiltrates was noted in the left base and hilar region also. Bronchograms were not diagnostic, but showed no evidence of obstruction.

Sputum studies were not informative, being negative for acid-fast bacilli as well as for evidence of neoplasm.

Bronchoscopy revealed the source of sputum to be the right middle lobe, but no cancer was seen.

Thoracentesis failed to yield fluid from the right chest. An aspiration biopsy from the right lung was performed and this material permitted the diagnosis of mucoid (gelatinous) carcinoma.

The patient was thereafter discharged, dying 4 months later. No autopsy is reported but the sputum had continued to be copious in amount and the changes as seen by means of roentgenography had been progressive.

Only 2 other such cases were found in the literature. These were published in 1841 and 1936. Both of these cases were diagnosed by postmortem examination. The mechanism responsible for such copious outpouring of secretions is not clear.

HIRAM T. LANGSTON, M.D.

Decortication of the Lung in the Treatment of Tuberculous Empyema. CONRAD R. LAM. *Arch. Surg.*, 1948, 56: 1.

It is obvious that the procedure of decortication cannot be applied indiscriminately in all cases of tuberculous empyema. The parenchymal lesion must not be forgotten. The fluid and cortex may actually be beneficial for a while, because of their immobilizing and compressive effects. Sooner or later, however, one must decide whether the lung should be re-expanded or permanently collapsed. Decortication may be of value, regardless of the decision.

If re-expansion of the lung is decided upon, decortication without thoracoplasty is the operation of choice. If intrinsic factors in the lung prevent its expansion, some alteration of the thoracic wall, obviously, may be necessary. If permanent collapse is desired, extrapleural thoracoplasty may be supplemented with decortication, to achieve final obliteration of the pleural space.

Pulmonary decortication was applied, with gratifying results, to 3 patients with effusions and unexpandable lungs, which complicated treatment by pneumothorax. In 2 cases, the procedure was used as an adjunct in the closure of large wounds of the chest, following extensive thoracoplastic procedures. In the third case, it was used as the primary attack on an unexpandable lung. SAMUEL KAHN, M.D.

HEART AND PERICARDIUM

Syndrome of Aberrant Right Subclavian Artery with Patent Ductus Arteriosus. HENRY P. BREAN and EDWARD B. D. NEUHAUSER. *Am. J. Roentg.*, 1947, 58: 708.

The authors detected 15 cases of aberrant right subclavian artery by roentgen examination at the Infants' and Children's Hospitals in Boston from September, 1945 to August, 1946. In 5 of the patients there was concomitant heart disease of a congenital nature (patent ductus arteriosus in 3 cases, the tetralogy of Fallot in 1 case, and an anomaly of uncertain structure, but apparently involving an intracardiac shunt in 1 case). In 2 of the 5 cases the condition—a patent ductus arteriosus in one case and a tetralogy of Fallot in the other—was surgically verified.

The 5 cases of aberrant right subclavian artery associated with congenital anomalies of the great vessels at the base of the heart are reported in detail. In 4 cases the respective roentgenograms are presented for the purpose of illustration.

The aberrant right subclavian artery takes origin from the extreme left side of the aortic arch and passes obliquely upward and to the right behind the esophagus. In so doing, it produces pressure on the posterior wall of the esophagus. By administering a swallow of barium mixture, a typical oblique extrin-

sic filling defect appears in the barium column which is especially well visualized in the lateral view. An anomalous subclavian artery passing between the esophagus and trachea or anterior to the trachea is uncommon and has not been encountered in the authors' series.

Of particular interest is the relatively high incidence of coexistent congenital heart diseases in the syndrome of aberrant right subclavian artery. The fact that a patent ductus arteriosus was observed in not less than 3 out of 15 patients suggests to the authors that the two entities may be related, either by one constituting a direct causation for the other, or by virtue of a common etiology and pathogenesis of both. The presence of certain virus infections in the first trimester of pregnancy may have in this respect a definite role. In one of the authors' cases the mother of the patient had German measles in the second month of pregnancy. There is accumulating evidence in the literature to the effect that German measles in early pregnancy is a common and potent factor in producing congenital heart disease, cataract, deafness, and other anomalies.

The authors discuss also the embryologic background of the syndrome of aberrant right subclavian artery and associated congenital heart disease. In the transformation of the aortic arches during the second fetal month, the fourth arch is normally absorbed just proximal to its junction with the dorsal aorta; the remainder of the arch becomes the normal right subclavian artery. In the anomaly, the proximal portion of the arch is absorbed instead; the portion of the arch which joined the dorsal aorta then constitutes the aberrant subclavian artery. In the presence of a coexistent tetralogy of Fallot it is reasonable to assume that both defects arose from the same disturbance of embryologic development. In the case of patent ductus arteriosus, however, the infectious theory appears more plausible, the defects being manifestations of a basic fetal abnormality induced by the virus agent.

In conclusion the authors stress the value of a routine barium swallow during roentgenoscopic examination of the heart and lungs.

T. LEUCUTIA, M.D.

ESOPHAGUS AND MEDIASTINUM

Present-Day Concepts on the Treatment of Esophageal Perforations. FRANCIS L. LEDERER, ARNOLD A. GROSSMAN, and W. ALLEN DONNELLY. *Ann. Otol. Rhinol.*, 1947, 56: 867.

Even before the advent of present chemotherapy there were conflicting schools of thought on the treatment of esophageal perforations. The problem is still undecided.

The interventionists recommend cervical mediastinotomy as soon as the diagnosis is made. The conservative group would rather wait and see if complications such as mediastinitis develop before they advise surgery, if at all. Since the use of penicillin, the conservative method is no longer as great a threat as it was before chemotherapy when 87 per cent of the cases terminated fatally.

Penicillin plays an important part in the treatment of this disease if we understand its limitations. It has by no means obviated the necessity of surgical intervention, especially when complications such as mediastinitis, pleural effusion, or empyema have occurred. Penicillin alone or with pleural aspirations, and the instillation of penicillin or streptomycin have been followed by cure in some cases.

Prior to the use of penicillin, prophylactic cervicotomy, done immediately, resulted in a 27 per cent death rate, and the authors believe that chemotherapy associated with this procedure would be the most logical approach. Posterior mediastinotomy carried out at the same time or later has been recommended by some authors when the infection spreads to the posterior mediastinum below the fourth thoracic vertebra.

Both Churchill and Neuhof recommend early operation on patients with esophageal perforations, without waiting for the infection to wall off or for roentgenographic evidence of mediastinitis to develop.

Since the use of penicillin, the pendulum has swung to the side of the noninterventionists. If a diagnosis of esophageal perforation is made, the procedure should be as follows:

Instillation of 100,000 units of penicillin intramuscularly every 2 hours; nothing should be taken by mouth; intravenous feedings should be given, or a gastrostomy is done in long drawn-out cases; the patient is placed in Trendelenburg position to prevent secretions from running down the esophagus; 100 per cent oxygen is administered to combat cyanosis, dyspnea, and restlessness; 50 mgm. of demerol is given every 4 hours as a sedative; anaerobic as well as aerobic bacterial investigations should be carried out; hydrogen peroxide sprays should be used to combat mouth organisms; iron and arsenic cacodylate (1 gr. daily) is given intravenously for 7 days; antigas gangrene and tetanus antitoxin, and small and repeated blood transfusions should be administered; sulfadiazine (1 gm. every 4 hours) and streptomycin (0.25 every 4 hours intramuscularly) should be started as early as possible; thoracic surgeons keenly observant of such cases should be consulted.

When is surgical intervention indicated? The authors believe prophylactic cervicotomy should be performed in all cases of high esophageal perforation. Even though one adopts the conservative approach outlined, surgery still may be indicated in the later phases of this condition. Certain "indicators" repeated at frequent intervals will aid in the decision for surgical intervention. These are (1) a history of known or suspected esophageal trauma, (2) roentgenographic evidence of air in the tissues; (3) clinical evidence of prevertebral or mediastinal emphysema, and (4) the course of the white blood count, the pulse, and the temperature.

If these "indicators" show no progression of the disease, expectant treatment can be continued. If

roentgenographic evidence and clinical findings plus some or all of the "indicators" show progression of the disease process, immediate surgery should be carried out in the area indicated. If it is a high esophageal perforation alone, then a cervicotomy must be performed at once. Following this, all "indicators" must be continued. If the chest film shows progression of the lesion, chest aspiration and instillation of penicillin or streptomycin is indicated.

If, in spite of this, the lesion progresses as evidenced in the volume of pleural effusion, determined by roentgenographic study, then posterior mediastinotomy is the immediate and urgent treatment of choice.

Three cases are presented, which illustrate the above outlined management. All 3 patients were treated with penicillin, and all survived. One patient required major surgery; in another, pleural aspiration with local instillation of penicillin was necessary; and in one patient conservative measures alone were enough.

The authors describe the treatment of esophageal perforations in 4 patients before the use of penicillin, one of whom survived.

The early symptoms of esophageal perforation are (1) severe, insistent pain at the site of perforation or between the shoulder blades, (2) dysphagia and expectoration of small quantities of blood, and (3) dyspnea and restlessness.

ROBERT R. BIGELOW, M.D.

Surgical Treatment of Cancer of the Thoracic Esophagus (Traitement chirurgical du cancer de l'oesophage thoracique). P. SANTY and ALAIN MOUCHET. *J. chir.*, Par., 1947, 63: 505.

Surgical treatment of cancer of the esophagus is justified because of its great frequency, its serious consequences, its failure to respond to other methods of treatment, and its relatively long period of operability. The annual deaths due to cancer of the esophagus range from 1,000 in Argentina, 2,500 in England, and more than 2,000 in the United States to 25,000 in Europe. In 1939, Ballivet could collect only 24 cases of surgical cure, while today the number of cures exceeds 400. The operative mortality has dropped from 71 per cent in 1941, to from 15 to 30 per cent. Metastases develop late in esophageal cancer. The percentage of operability increases with the experience of the surgeon, and today radical extirpation, even of tumors adhering to both pleurae, lungs, or a bronchus is advocated. A brief résumé of the historical aspects of surgery of esophageal cancer, of the surgical anatomy of the esophagus, and of the pathologic anatomy of thoracic esophageal cancer follows.

The frequently long period of latency between onset of the malignant process and appearance of clinical symptoms is emphasized. Frequently patients do not arrive for treatment until 4 or 6 months after the onset of symptoms. The tumor may remain operable for a long time after symptoms have appeared, but in some instances it becomes inoperable within one month of the onset of symptoms. The first symptom is dysphagia for solid foods. Other early symptoms include regurgitations, emaciation, epigastric distress following deglutition, retrosternal heaviness, or a burning sensation, cough, attacks of severe pain, which may suggest angina pectoris. The roentgenologic, esophagoscopic, and bronchoscopic findings are described. Delay in surgical intervention may be due to loss of time in trying to relieve the dysphagia by antispasmodics or antisyphilitic therapy, poor roentgenograms, or poor interpretation of esophagoscopic findings.

The contraindications to operation include fixed back pain, pain on percussion of the spinous apophyses, or fever and increased pulse rate, indicating a large infected or ulcerated tumor. Neither weight loss nor debility are definite contraindications to operation. Absolute contraindications include pulmonary metastases, and metastases to the liver, peritoneum, or supraclavicular glands. Complicating abscess or fistula excludes the patient from surgical treatment, as well as cachexia persisting after 3 weeks of preliminary preparation. Also patients with cardiorenal lesions, bronchopulmonary lesions, and irreversible hepatic lesions are excluded. The physical condition of the patient counts more than actual age in determining operability, as some good results have been reported in patients over 70 years of age. Reversible cardiorenal and bronchopulmonary lesions may, of course, respond to proper treatment and leave the patient amenable to operation. Preoperative preparation includes alimentation, rehydration, administration of vitamins and calcium, and injections of prothrombin.

Other preparative procedures include oropharyngeal disinfection, esophageal disinfection, respiratory exercises, and administration of sulfadiazine and penicillin aerosols. Preliminary gastrostomy is indicated only when the tumor is very stenotic, situated high up in the esophagus, and supra-aortic, so that only a Torek operation or cervical exeresis can be considered. Jejunostomy is indicated only in the presence of a rigid stenosis in a greatly debilitated patient who cannot be properly fed, or in a patient whose cardiovascular system would not tolerate numerous intravenous perfusions following radical operation.

The classic technique for operation on cancer of the lower third of the thoracic esophagus is described, namely transpleural segmentary esophagectomy from the left side, followed by low intrathoracic anastomosis. The advantages of Garlock's abdominothoracic approach are enumerated. Before closure of the abdomen, he advises terminating the operation by instituting a jejunostomy so that the patient can be given nourishment immediately.

In operating on cancer of the middle third of the thoracic esophagus, 3 types of operation have to be considered; namely, (1) the ideal operation, or resection followed by high left transpleural intrathoracic anastomosis (Garlock and Sweet); (2) right or left esophagectomy by Torek's technique; and (3) resec-

tion followed by esophagogastric anastomosis from the right side necessitating a preliminary abdominal stage of gastrolysis. In the last type one may choose between three techniques; namely (1) the technique of Santy and Ballivet, (2) the technique of Ivor Lewis, and (3) the technique of Herman Taylor. These are all described, with the advantages and disadvantages of each. The three esophagogastric anastomotic procedures in use include anastomosis by invagination, button anastomosis, and suture anastomosis.

Unusual routes of approach include the cervical, the upper thoracic, and cervicoabdominal tunneling.

For cancer of the lower third of the esophagus, the procedure of choice is block resection of the tumor and its glands by the left transthoracic route, with immediate restoration of continuity by esophagogastric anastomosis. For a tumor extending toward the cardia, an abdominothoracic incision may be considered. For cancer of the middle esophagus, the Torek operation should be rejected for esophagectomy followed by high anastomosis. For cancer of the upper thoracic esophagus, i.e., supra-aortic cancer, opinions still differ as to the best method of approach. There is no satisfactory solution to this problem, for it is quite impossible to restore continuity. For these, fortunately rare, tumors an attempt at the cervical approach, the Torek intervention, or tunneling may be made.

The best methods of combating postoperative complications of the early and later postoperative periods are discussed. Among the early measures are antishock therapy, emergency evacuation for valvular pneumothorax, and bronchial aspiration for atelectasis. Infectious complications demand prompt application of sulfonamide therapy, penicillin, and pleurotomy for evacuation of the purulent collection. The site of infection is not always easily established.

Cardiovascular complications are common and often beyond therapeutic help. Chylothorax may result from injury to the thoracic duct and constitutes a serious complication, as does, likewise, diaphragmatic hernia through an inadequately sutured diaphragmatic incision. Rupture of the sutures may be partial causing purulent pleurisy which requires drainage, and occasionally an emergency jejunostomy. Partial fistulization is curable. Total rupture of the sutures usually occurs earlier and is fatal as a rule. Finally, there are the late complications of stenosis of the anastomosis which, if not too pronounced, may respond to endoscopic dilatation. Late diaphragmatic hernia may be discovered accidentally and does not always require treatment. In button anastomosis the danger of fulminating hemorrhage, due to ulceration of the aorta when the button is left *in situ*, has to be considered. Generally speaking, complications are more frequent following high anastomosis, and, also, cardiac complications are more numerous in these cases. Crushing of the phrenic nerve may prevent traction on the anastomosis and facilitate healing of the phrenicotomy. Division of the two pneumogastric nerves may interfere with peristalsis and cause pyloric spasm. Postoperative gastric disturbances are not uncommon, but these are temporary symptoms. Sweet was obliged to do a secondary pyloroplasty in one case. Patients should be warned not to lie down after eating, as in this position regurgitation may be annoying. In none of Sweet's cases did partial or total transposition of the stomach into the thorax cause the slightest respiratory or cardiac disturbance. Sweet's statistical results are reviewed; they show a higher mortality for higher anastomoses. Low resections appear to give about the same end results as high resections. From 30 to 40 per cent of the patients subjected to low resection survived from 2 to 3 years. In 1945, Garlock reported 24 survivals without recurrence for periods of from 10 years to 1 month after operation. These results obtained in the United States are proof of the possibilities of surgery of cancer of the esophagus when practiced by trained specialists and trained assistants in medicine, bronchoscopy, anesthesia, and radiology.

EDITH SCHANCHE MOORE.

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Technical Improvement in the Introduction of a Thread Guide and Its Recovery with an Electromagnet in Gastrostomy for Cicatricial Stenosis of the Esophagus (Accorgimento tecnico nell'introduzione del filo-guida e suo ricupero con l'elettrocalamita nei gastrostomizzati per stenosi cicatriziale dell'esofago). AMPELIO CUSATELLI. *Chirurgia*, 1946, 1: 328.

The author has developed a new method for passing a thread through a stenosed esophagus emerging through a gastrostomy, for the purpose of passing Tucker sounds for dilatation. He uses small iron balls beginning with a diameter of 1.5 mm. and up. These are bored with a bore which has one half side larger than the other so that it will be possible to anchor the knot of the thread used. He prefers to use a small metal chain, such as is used for neck medals, to silk thread. Since the type chains available to him are not magnetic he attaches the iron ball to the end. He recommends that the chain be as flexible as possible. The smallest usable type that he was able to obtain measured 0.7 mm. in width. Chains up to 2 or 3 mm. may be used, the important point being that they be flexible. The length used is 50 cm. although from 20 to 30 cm. would be sufficient. He states that the use of the metal ball would be superfluous if these chains could be made of steel or other magnetic metal. The electromagnet is made of soft iron in the shape of a baton upon which is woven an insulated copper wire. This is mounted on an ebony handle and is furnished with an introducer. It is made in two sizes—5 mm. in width and 12 cm. in length, and 5 mm. in width and 25 cm. in length.

The chain and ball are introduced through the nose and the length necessary to reach the external opening at the gastrostomy is measured so as to avoid its going on beyond the pylorus. The position is controlled with roentgenographic study. If there is difficulty in passage, small sips of water will usually help. When the ball has reached the stomach the patient is placed in the supine position so as to allow it to rest on the posterior wall. The electromagnet is then introduced under roentgenographic control and when it is near the ball the current is turned on. The ball is then easily extracted. Direct current is necessary for the magnet and the author uses batteries that are used with endoscopic instruments. The small magnet requires 4 volts, the larger 6 volts.

The roentgenographic control is recommended at the beginning but after the opening is somewhat enlarged the procedure can be easily carried on without its aid.

This procedure is recommended for persons who object to the constant wearing of the usual silk thread guide and the chain and ball are introduced at each dilatation. LUCIAN J. FRONDUTI, M.D.

Surgical Treatment of Cardiospasm. EARLE B. KAY. *Ann. Surg.*, 1948, 127: 34.

Instrumental dilatation of the esophagogastric junction may result in temporary symptomatic improvement in cardiospasm. This form of therapy may not be successful or may be contraindicated when there is marked tortuosity of the esophagus.

Numerous operative procedures have been used in the treatment of this condition with variable results. Techniques designed to enlarge the esophagogastric stoma have given the best results. The functional improvement is usually better than the change in x-ray appearance of the esophagus. The transabdominal approach is favored by most surgeons who believe that it is associated with less risk.

The author describes the technique employed and the results following transpleural cardioplasties in 17 patients. In none of these patients had the condition been significantly improved by dilatations. Symptomatic improvement and a marked reduction in size of the esophagus was observed postoperatively.

All cardioplasties were performed through a transpleural approach. The stoma was made large enough to allow reduction in size as the caliber of the esophagus decreased. The first three cardioplasties were performed in a manner similar to a Finney pyloroplasty, and the others were carried out in a manner similar to a Heineke-Mikulicz pyloroplasty. The latter procedure was easier and more satisfactory.

The lower esophagus is mobilized and carefully inspected before the diaphragmatic hiatus is incised radially. The author stresses the importance of inspecting and incising any limiting bands in the diaphragmaticoesophageal ligament. This ligament appeared responsible for the esophageal obstruction in 5 patients. Detailed descriptions of several cases in which this ligament caused obstruction are given. The site of the ligament can best be inspected by enlarging the diaphragmatic hiatus, incising the peritoneum, and retracting the cardia of the stomach into the thorax. The esophagus and stomach are occluded by umbilical tapes. A longitudinal 4 inch incision is made through the esophagogastric junction. This opening is closed transversely in two layers. Approximately 100,000 units of penicillin are injected about the stoma. The stomach and new stoma are replaced in the abdomen and the diaphragm closed about the esophagus at a higher level. The chest is closed without drainage.

The only postoperative complications have been transient collections of serum in the pleural space of 4 patients. Hourly feedings of milk are begun as soon as the patient recovers from anesthesia. The Wangensteen suction pump is clamped intermittently for 3 days. The usual postoperative gastric diet is then provided.

All these patients were convinced of the greater relief afforded by operation as compared to instru-

mentation. Many patients exist for years with partial relief afforded by instrumentation without realizing the more complete and permanent benefit from this operation. ROBERT R. BIGELOW, M.D.

A Statistical Study of 112 Cases of Benign Gastric Ulceration. MAURICE FELDMAN. *Am. J. M. Sc.*, 1948, 215: 13.

In a detailed study of a series of 7,300 ambulatory patients presenting varying digestive disturbances, peptic ulceration was found in 1,266 cases. Of these, 1,154 (86.7%) were duodenal lesions and 112 (17.3%) were gastric. An analysis of the duodenal ulcers having previously been reported, the author here concerns himself with the statistics of benign gastric ulcer in relation to (1) incidence, (2) site, (3) age and sex, (4) duration of symptoms, (5) symptoms and signs, and (6) recurrences.

The corpus and cardia were found to be involved in 74 cases, and in 38 patients the pylorus was the site of the ulceration. By comparing cases seen during the period from 1937 to 1941 with those examined in the period from 1941 to 1946, the incidence of gastric ulceration was found to have increased from 0.8 to 1.2 per cent during the war years. There was a slight increase in the incidence of gastric ulcer in females during the years of war, and gastric ulcers of short duration (or acute ulcers) were generally more common during this period. Recurrences were found to be less frequent in gastric than in duodenal ulcers. Pyloric ulceration was found in 38 of the 112 cases; save for a greater prevalence of obstruction, the behavior of the pyloric lesions was like that of the gastric type. WAYNE F. CAMERON, M.D.

Clinical and Pathologic Studies of Papillary Mucous Tumors of the Stomach; Gastric Papillomas (Beitrag zur Klinik und Pathologie der papillaeren Schleimhautgeschwuelste des Magens (Magenpapillome). A. IKLE. *Helvet. chir. acta*, 1947, 14: 435.

Seven cases of papillary fibroepithelial gastric tumors, 3 in men and 4 in women, are reported by the author. The lesion usually does not become manifest before the fifth decade and affects both sexes equally. The role of hereditary factors could not be established in the author's material.

Digestive disturbances accompanying the lesion do not allow its differentiation from an ulcer or a cancer. A tumor is palpable only in rare instances. Secondary anemia is often found and occult blood is nearly always demonstrable in the feces, while hematemesis occurs with lesser frequency. Hypacidity or anacidity is present in practically every case. Roentgenologically, filling defects without induration of the adjoining portions of the stomach wall and without interference with the peristalsis allow differentiation of the condition from a cancer. A spongy, foamy pattern, created by the papillary formation, may sometimes be demonstrated in the roentgenograms.

Palpation of the exposed stomach may fail to reveal the tumor and, therefore, if the roentgenologic findings are positive, an incision through the stomach wall is indicated. A simultaneous occurrence of a papilloma and a peptic ulcer was observed by the author in one case. A combination of a papilloma and a cancer has also been reported.

In view of the fact that papilloma of the stomach should be considered a precancerous lesion, an extensive gastric resection is indicated.

Pathologically, the structure of papillomas of the stomach resembles that of similar lesions in the large intestines and in the urinary bladder.

JOSEPH K. NARAT, M.D.

The Terminolateral Anticolic Gastrojejunostomy in Gastric Resection (La gastro-digiunostomia termino-laterale antecolica nella resezione gastrica). NINO DELLA MANO. *Boll. Mem. Soc. piemontese chir.*, 1946, 16: 431.

The author, a student of Donati, believes that antecolic gastroenterostomy should have a more widespread application than it now has. He feels, however, that the type of operation performed should depend upon the findings at the operating table.

Certainly in a patient with a wide transverse mesocolon with extensive zones showing no blood vessels, one should not do an antecolic gastrojejunostomy. However, in the presence of a retracted mesocolon or one not well developed, or one with extensive blood vessels in which difficulties would be encountered in attempting to accomplish an opening wide enough, one may constrict the blood vessels and thereby place the vitality of the transverse mesocolon in danger. In these cases the author suggests giving preference to the antecolic anastomosis without using the deprecated enteroenterostomy of Braun.

Gastric resection until recently was considered a grave intervention, not without dangers, for which a special technique was recognized. It was considered in the domain of an elected few, and a high mortality was expected. At present, however, with the perfections obtained in the technique, with the adoption of local anesthesia, with the preparation of the patient by means of efficacious therapeutic measures (chief of which is blood transfusion), and with the measures at hand to combat complications, it has become the common practice of any surgeon. The mortality has markedly decreased because of the improvements in both technique and therapy.

The principles of gastric surgery as expounded by Donati and followed by his students are: to make the intervention as simple as possible, to make use of any contribution which would make the execution of the operative act less difficult, to reduce the immediate dangers and eliminate the conditions which may favor disturbance in function in the future.

LUCIAN J. FRONDUTI, M.D.

Lipomas of the Large and Small Intestine. ROBERT J. TENNER. *J. Lancet*, 1948, 68: 12.

The author felt that a careful clinical and pathological study of submucous lipomas would be of

value because they so closely resemble malignant neoplasms of the bowel in clinical features.

The lipoma is the second most common benign tumor of the intestinal tract. The adenomatous polyp is first and the fibroma third. Submucous lipomas are more frequent than subserous ones and are also more apt to produce symptoms. Intussusception is a common and important complication of submucous lipomas.

Twelve cases of submucous and intramuscular lipomas of the large and small intestine are presented.

Pain was reported to be the most common symptom; it lasted 9 years in one case and only 2 months in another. Vomiting and constipation were present in 6 of the 12 cases. Diarrhea was not a common symptom. Definite weight loss of as much as 25 pounds was frequent. A mass palpable on physical examination was present in 8 cases; the tumor was demonstrated by the roentgenologist in every case. Ulceration of the mucosa covering the tumor was found microscopically in 11 cases. Occult blood in the stool was found in only 5 cases.

Seven of the lipomas were found in the colon, and 3 in the cecum, and 1 each was found in the jejunum and ileum. The average age of the 12 patients was 53 years.

Six of the lipomas were found in the submucosa, 3 had their origin between the inner circular and the outer longitudinal muscles of the intestinal wall, and 3 had their origin within the inner circular muscle. The author classifies these as submucous, intramuscular, intermuscular, and subserous.

Treatment of the tumors is surgical, either local excision with direct closure or anastomosis if the lesion is not too extensive. A resection of the segment of bowel containing the tumor is frequently done.

W. Foster Montgomery, M.D.

Obstructive Lesions of the Small Intestine and Sigmoid Due to Irradiation. James G. Spackman. *Ann. Surg.*, 1948, 127: 121.

The author presents a series of 5 case reports to emphasize the late clinical picture of obstruction due to irradiation. In each case the irradiation was for pelvic carcinoma. Patients who develop low sigmoid and rectosigmoid lesions soon after irradiation complain of cramplike abdominal pains associated with frequent small liquid stools containing mucus and blood. When the acute hyperemia and mucosal edema phase recedes and is replaced by cicatricial contraction, the physical signs of low sigmoid obstruction appear.

Since the terminal ileum is frequently in the pelvis, signs of small intestinal obstruction may often appear earlier than those of obstruction of the low sigmoid.

It is important to remember that any patient who has received irradiation and later develops bowel symptoms (abdominal pain, nausea, vomiting, and change of bowel habits) does not necessarily have a recurrence of the primary neoplasm. The stenosing obstructing lesion may be a late result of irradiation, amenable to proper surgery and with a more favorable prognosis. Abdominal exploration after appropriate study is indicated in all cases.

If the sigmoid lesion is acute and not due to scarring, a proximal colostomy may lead to regression by decreasing the edema and infection and eventually restoring the normal lumen. In dealing with all these lesions, the author believes a preliminary proximal diverting colostomy is indicated.

Robert R. Bigelow, M.D.

Neurinoma of the Small Bowel with Secondary Volvulus of the Ileocecum (Neurinoma del tenue e volvolo secondario dell'ileo-cieco-ascendente). Leonida Manzocchi. *Chirurgia*, 1946, 1: 132.

The author reports a personally observed case in which the patient presented a picture of recurring attacks of abdominal pain accompanied by mechanical ileus. Gynecological examination revealed a tender mass about the size of a fist in the right pelvic cavity which was displacing the uterus anteriorly. The patient was considered to have an ovarian cyst which had twisted on its pedicle. She also was found to have rheumatic mitral valve disease which had been present since early youth. She was now 65 years of age.

At operation she was found to have a volvulus affecting the distal ileum, cecum, and ascending colon. There were 360 degrees of rotation in a clockwise direction. The involved bowel was distended and presented multiple punctate hemorrhages. A large loop of jejunum was also present, extending from front to behind the volvulus. This loop was stretched and attached superiorly at its mesenteric origin. It was stretched into the pelvic cavity by the weight of a tumor mass about the size of a large fist. It was white in color, granular, and of rubbery hard consistency. The origin was from the convex margin of the bowel. About 15 cm. of jejunum were resected and an end-to-end anastomosis was performed. The volvulus was then easily reduced. A lymph gland was also removed for biopsy.

The postoperative course was stormy because of cardiac decompensation with improvement after the fifth day. Ten months later the patient had no symptoms. The microscopic diagnosis was neurinoma.

The literature is reviewed and some of the interesting points are brought out. Neurinoma or schwannoma, a tumor found frequently in the central and peripheral nervous system, has been found especially recently in various organs. It can be found in any organ which contains myelinated or amyelinated fibers furnished with a sheath of Schwann. Two morphologic types are described, the fascicular and the reticular. The digestive system is the most frequent site of a neurinoma outside of the nervous system.

The clinical picture may be that of intestinal hemorrhage, palpable abdominal tumor, intestinal obstruction, or inflammation simulating acute appendicitis with peritonitis.

The histological diagnosis is at times difficult and may resemble small spindle cell sarcoma. Two cases of neurinoma have been reported to have become malignant. The author, however, is inclined to believe that neurinomas are benign and that those which have been reported as having undergone malignant change were not neurinomas to begin with. Altogether, 13 cases have been reported in the literature.

There are excellent illustrations depicting the anatomy as found at operation and also the histology of the tumor mass. LUCIAN J. FRONDUTI, M.D.

Delayed Results of the Surgical Treatment of Duodenal and Gastric Ulcer (Resultados alejados del tratamiento quirurgico de la ulcera gastrica y duodenal). RODOLFO E. PASMAN. *Rev. As. méd argent.*, 1947, 61: 883.

Pasman reports the surgical results obtained in a series of 182 gastrectomies done in the period from 1940 to 1946; 36 were performed for gastric ulcer, 146 for duodenal ulcer, and 11 for jejunal ulcer. The overall mortality was 4.6 per cent.

The author recommends subtotal gastrectomy as the elective surgical treatment for peptic ulcer and believes that gastroenterostomies are indicated only in exceptional circumstances. Extensive resection of the stomach is advised to avoid the formation of jejunal ulcers, which did not occur in any case of this series. The author compared these results with those obtained in the period from 1929 to 1940—61 gastroenterostomies with a mortality of 10 per cent, and 228 gastric resections with a mortality of 14 per cent.

WILLIAM E. RICKETTS, M.D.

Delayed Results of the Surgical Treatment of Duodenal and Gastric Ulcer (Resultados alejados del tratamiento quirurgico de la ulcera gastrica y duodenal). FEDERICO E. CHRISTMAN. *Rev. As. méd. argent.*, 1947, 61: 888.

Christman reports the overall results obtained in 673 patients subjected to gastric operations. One hundred ninety-four had gastric ulcers, 331 had duodenal ulcers, 169 had juxtapyloric ulcers, and 5 had jejunal ulcers. There were also 47 perforated ulcers. The operations done were 120 gastroenterotomies and 394 gastrectomies, the total mortality being 56.

The author emphasizes the importance of preoperative and postoperative care of patients to reduce the incidence of mortality after resection of the stomach. The treatment of peptic ulceration is considered primarily a medical problem and surgery is advisable only when there has been failure of the medical treatment. The main indication for surgery is perforation of an ulcer.

WILLIAM E. RICKETTS, M.D.

Obstruction Due to Volvulus of the Colon. R. K. GILCHRIST. *Arch. Surg.*, 1948, 56: 79.

The author reports his experience with 5 cases of acute obstruction. In 4 of the patients the condition was caused by volvulus of the sigmoid and in 1 patient by volvulus of the cecum.

In older patients with acute obstruction caused by volvulus of the sigmoid, there is usually a history of repeated attacks of constipation or of partial obstruction; such history is absent in the younger patient. The patient usually does not appear as sick as one might expect with carcinoma. Abdominal distention may be pronounced but vomiting occurs late. The red blood cell count and the hemoglobin value are usually not much below normal. Pain over the dilated intestinal loop is particularly marked where the twist puts a pull or pressure on the root of the mesentery. This pain is very severe if there is much interference with the circulation.

In sigmoidal volvulus, decompression may be obtained by placing the patient in the knee-chest position and doing a sigmoidoscopy. In very sick patients cecostomy is indicated, to be followed by a resection of the sigmoid at a later time. Obstruction due to volvulus is not relieved by intestinal Miller-Abbott intubation and suction.

Resection is the treatment of choice. When an interval operation can be performed, resection and end-to-end anastomosis are feasible. Lateral anastomosis will give good results in some patients. Untwisting and fixation are unsatisfactory.

Volvulus of the cecum depends on the failure of fixation of the colon. Cecal obstruction is associated with early obstruction of the small bowel; vomiting occurs earlier, dehydration ensues, and the patient appears more sick than the patient with sigmoidal volvulus. Intestinal intubation with suction is useless. Early operation is indicated. Untwisting and fixation to the bottom of the pelvis and left pelvic wall is the safest method of treatment. If this procedure fails to give permanent relief, resection of the redundant bowel with lateral anastomosis is indicated at a second operation. If the bowel is gangrenous, resection with transverse colon ileostomy is indicated. ROBERT TURELL, M.D.

An Evaluation of the Clinical Management of Chronic Ulcerative Colitis. EVERETT D. KIEFER. *Gastroenterology*, 1948, 10: 16.

Chronic ulcerative colitis is discussed in relation to the three main objectives in management: (1) the control of symptoms and support of the patient's general condition; (2) the cure or arrest of the colitis; (3) the success or failure of the treatment in preventing chronic invalidism.

The first phase is stressed because "specific therapy" has not been generally successful and, therefore, palliation and supportive measures have been important until the patient's natural resistance could bring about a remission or an arrest of the disease. Diarrhea is managed by a low residue diet which does not stimulate intestinal motility, and by kaolin or bismuth to slow motility and solidify the stools. Deodorized tincture of opium is of value in acute flare-ups of diarrhea, and papaverine in dosages up to 6 gr. per day is used to control cramps

and diarrhea. Bed rest and sedation are important measures. In acute emergencies, complete starvation with intravenous alimentation is maintained for several days. Malnutrition is treated chiefly by a liberal diet, with proteins stressed in cases in which hypoproteinemia exists. Protein hydrolysates and intravenous amino acids are both of use in protein deficiency. Supplemental vitamins, particularly vitamins C and B complex, are important because of impaired absorption in ulcerative colitis. Electrolyte loss is corrected by intravenous saline solution plus glucose, and when hypochloremia is marked an additional 10 gm. of sodium chloride per liter of intravenous infusion is used. Blood protein depletion and anemia are corrected by the liberal use of transfusions of whole blood and plasma. Iron in the form of ferrous sulfate or ferrous gluconate is used for mild anemia. Foci of infection or any other defect in the patient's general health receives specific attention. The emotional problems of the patient and his adjustment to the disease receive care.

In analyzing the effect of the "specific therapy" upon the disease, the cases were divided into (1) the afebrile, nontoxic conditions of comparatively short duration which were usually relieved by nonspecific management, (2) the febrile, toxic manifestations of ulcerative colitis, usually with complete involvement of the colon, and (3) those cases in which there was extensive irreversible organic damage of the colon and rectum which made return to normal function practically impossible.

All patients who received "specific therapy" also received palliative, supportive therapy. The effectiveness of the "specific therapy" was estimated by reviewing the hospital records of the patients and checking the effect of the treatment upon the diarrhea and the fever. The cases were first carried for a period of several days of nonspecific treatment to establish a base line.

Many specific agents were tried. The list included the diplostreptococcus vaccine of Bargen, sulfanilamide, neoprontisil, sulfadiazine, sulfaquanidine, sulfasuxidine, sulfathalidine, penicillin, streptomycin, fever therapy with intravenous typhoid vaccine, antiamebic therapy, and antiallergic treatment. In almost all cases the results were poor or equivocal. Of the sulfonamides, sulfaquanidine gave the best response, but only 7 of 26 patients were definitely benefited by the treatment. Penicillin and sulfasuxidine were of greatest value as adjuncts to preoperative and postoperative management, and in controlling complications of the disease such as abscess or peritonitis. Antiallergic treatment was of questionable value but perhaps diets eliminating milk, wheat, eggs, and fresh fruit are of some value.

A tabulation of the 527 cases in which the patients were treated medically and followed up for 2 years or more showed that the results were satisfactory in 46 per cent and unsatisfactory in 54 per cent of the cases. Medical management was successful in about two-thirds of the patients with the milder forms of the disease; only one-third of the patients with more severe forms of the disease obtained satisfactory results. Of 400 patients treated medically 99 eventually had to come to operation.

FREDERICK C. HOEBEL, M.D.

The Surgical Treatment of Ulcerative Colitis. RICHARD B. CATTELL. *Gastroenterology*, 1948, 10: 63.

Surgical treatment of ulcerative colitis accomplishes two things. First, it places the colon and rectum at complete rest by defunctionalizing them by diversion of the fecal stream. Second, it permits removal of the affected bowel when the infectious process cannot be arrested by medical means.

Medical management includes physical rest, a low residue, nonirritating diet, and the use of antispasmodics to decrease intestinal contraction, but none of these measures are as effective as ileostomy. Ileostomy can also be used for treatment of the defunctionalized colon if it is considered desirable since it permits satisfactory mechanical cleansing of the bowel, the use of antiseptics or antibiotics, as well as bland solutions or emulsions.

Over a period of 20 years at the Lahey Clinic, 26 per cent of the patients under treatment for ulcerative colitis have been operated upon. A review of the fatal cases following operation demonstrates at once that two-thirds of the fatalities occur when operation is done as an emergency. The mortality will probably always be high no matter at what time in the period of observation of the acute fulminating case operation is decided upon, but it will be much lower if ileostomy is done within 2 or 3 days, during which time supportive measures, including the use of antibiotics and blood transfusions, are employed. There will also be a higher rate of complete remission of symptoms. This will permit closure of the ileostomy in 10 per cent or more of the cases.

The importance of malignant degeneration in patients having ulcerative colitis for many years has not been sufficiently appreciated; 7 per cent of all patients who had been operated upon developed it. Furthermore, of the group of patients who had had ulcerative colitis for 9 years or more, 1 in 3 had carcinoma—an additional reason for performing colectomy in long-standing cases, particularly in those in which the discharge of blood continues. Once the malignancy develops, it will usually be found to be inoperable since early dissemination is frequently encountered.

One would not be justified in submitting patients to operation unless their condition subsequent to operation would be consistent with a reasonable activity, both from the economic and the social point of view. In the early experience with ileostomy, it must be admitted that its management was unsatisfactory. At the present time, however, the management of an ileostomy is no longer a difficult problem. The patients can be fitted with a temporary bag, such as the Travellor, which will fit any ileostomy, and it can be applied within 7 to 10 days of operation. Within a period of 6 to 8 weeks a permanent bag of the Rutzen type can be utilized. This bag is cemented to

the skin and prevents any ileal discharge from coming in contact with the abdominal wall, which avoids all possible irritation. Furthermore, it can be worn equally well at night so that there is no soiling of the bed clothes.

Unfair comparisons of the mortalities following the medical and the surgical treatment of ulcerative colitis are frequently made. It should be appreciated that the selected group of patients submitted to surgery represents only the most serious and complicated cases—the medical failures. All physicians interested in this subject are willing to accept the fact that all patients with ulcerative colitis should be treated medically as long as they can be cared for satisfactorily. Approximately a fourth or less of the total cases are submitted to operation. While the mortality over a 20 year period was 22 per cent, during the last 2 years it has dropped to 4 per cent because of the experience gained in the earlier years.

STEPHEN A. ZIEMAN, M.D.

The Arterial Supply of the Distal Colon Pertinent to Abdominoperineal Proctosigmoidectomy, with Preservation of the Sphincter Mechanism. HARRY E. BACON and CALEB H. SMITH. *Ann. Surg.*, 1948, 127: 28.

The arterial pattern of the colon has been a fundamental factor in determining the types of surgical procedures which can be successfully applied to that segment of the intestinal tract. In the surgery of the sigmoid and rectum, the configuration of the arteries supplying these areas has been a particularly important consideration.

In the development of the present technique of abdominoperineal proctosigmoidectomy with preservation of the sphincter mechanism, extensive precautions have been taken to insure the viability of that portion of the colon which is brought down to the perineum. The feasibility of the operation was first established in animals. In 71 cadavers the vascular supply of the colon and rectum was studied, and the mobilization and transplantation of the viable bowel to the anus were proved to be practicable. In every operative case the pattern of the inferior mesenteric artery and its branches was noted by transillumination before any vessels were ligated.

The arterial supply to the segment of the bowel to be transplanted to the anus was observed by the same means after ligation of the inferior mesenteric artery. The distal point of viability was marked with a black silk suture, which facilitated its identification during the perineal phase of the operation. The distal point of viability was brought 7 cm. outside the anus. Viability was further assured by incising small vessels in the mesentery of the bowel and noting free bleeding.

This experience with abdominoperineal proctosigmoidectomy with preservation of the sphincter mechanism in 264 cases (from a total of 407 colon resections) may be considered to have been a method of study of the arteries to the sigmoid and upper rectum.

The configuration of the inferior mesenteric artery and its branches must be determined in each case by transillumination of the mesentery. Only in this way can the proper point for ligation be established consistently. Thus, on the basis of studies of cases at operation the authors have confirmed the recommendation of both Sudeck and Hartmann that it is wise to observe in each patient the arterial pattern of the inferior mesenteric artery and its branches.

In the technique of abdominoperineal sigmoidectomy with preservation of the sphincters, the last sigmoidal artery may be disregarded. The superior hemorrhoidal artery cannot be ligated below the origin of this vessel and allow sufficient mobility of the bowel to permit its being brought down to the anus without tension. As a corollary, it is impossible in performing this operation to clamp the superior hemorrhoidal artery at the critical point of Sudeck.

The authors have been able to segregate those cases in which ligation may be made safely between the lowest two sigmoidal arteries from those in which ligation must be performed higher than the second lowest sigmoidal artery to assure viability, by the simple precautions previously described. Chief among these measures has been transillumination of the mesentery before and after ligation of the inferior mesenteric artery.

In an end-to-end anastomosis following resection of the sigmoid, viability of each end must be assured.

In performing abdominoperineal proctosigmoidectomy with preservation of the sphincter mechanism, the critical point of Sudeck need hardly be considered. Ligation of the inferior mesenteric artery must be performed above the lowest sigmoidal artery at least, to permit the mobility of the colon necessary to bring it to the anus. Furthermore, the inferior mesenteric artery may be deliberately ligated much more proximally in cases in which more of the upward lymphatic pathway is to be removed, or cases in which one is not completely satisfied with the competency of the circulation to that portion of the bowel to be brought to the anus. In the average case the most convenient place to ligate the inferior mesenteric artery is immediately below the first sigmoidal branch, which can be recognized by the large anastomosis it forms with the left colic artery.

In selected cases of polyposis, ulcerative colitis, diverticulitis, and lymphopathia venereum, the rectum, sigmoid, descending colon, splenic flexure, and a portion of the transverse colon have been excised. In these cases all branches of the inferior mesenteric artery have been ligated and the stump of the transverse colon has been brought down to the perineum. Viability has been maintained by the middle colic artery.

CHARLES BARON, M.D.

Haustrocecal Invagination (Invaginazione austracecale). RICCARDO SCENDRATE. *Boll. Mem. Soc. piemontese chir.*, 1946, 16: 463.

The author reports a case of haustrocecal invagination which was diagnosed at the operating table, but the preoperative diagnosis was acute appendici-

tis. The cecum was near the hepatic angle and the lateral and anterior walls were invaginated into the lumen of the cecum. The base of the appendix was involved in the intussusception. The ileocecal valve was not invaginated. A loop of small bowel about 20 cm. from the valve was invaginated into the cavity formed by the invagination of the anterolateral wall of the cecum. The ileal loop was in good condition and contained hemorrhagic fluid. The wall of the cecum was markedly edematous.

The invagination was easily reduced and cecal plication extending into the ascending colon was performed. The appendix was removed and the lateral wall of the cecum was fixed to the lateral abdominal wall. The postoperative course was good.

The literature is reviewed and the conclusion was reached that there is no definite clinical picture and the etiology is obscure. Most cases are diagnosed as acute appendicitis. The author maintains, however, along with Rizzo, Sorena, and Angeli, that if the condition is kept in mind there are sufficient signs to enable one to make a diagnosis. The important points are:

The patient usually has had abdominal cramps many times; the pain is not continuous; there may be diarrhea with blood, especially with cecocolic invagination, occlusive phenomena, meteorism, and vomiting. There is tenderness and muscle spasm in the region of the appendix during the attacks of pain. In between the attacks the abdomen is relaxed and at this time a small mass about the size of an egg with indistinct margins can be palpated. Most important is the fact that palpation of the mass frequently causes attacks of pain. While roentgenographic study with a barium enema is of value, it is considered too dangerous a procedure to use except in recent mild cases. Previous experience is considered of great help in making a diagnosis. To prove this point a second case is reported in which the diagnosis was made preoperatively. The diagnosis was confirmed by roentgenographic studies and also at operation. LUCIAN J. FRONDUTI, M.D.

An Acute Condition of the Abdomen following Gangrene of the Wall of the Cecum (Addome acuto da gangrena parietale del cieco). EROS BENEDINI. *Chirurgia*, 1946, 1: 285.

The author presents a case of gangrene of the cecum caused by carcinoma of the colon at the hepatic flexure. The patient had had a heavy sensation in the right iliac fossa for over a year with slight change in bowel habit manifested by poorly formed stool from time to time. He then developed a sudden attack of pain in the right iliac fossa which lasted for one-half hour. About 9 days later he had a second attack which lasted for 1.5 hours. Again 3 days later he developed a third attack. This time, however, the pain persisted and was accompanied by vomiting.

The patient was hospitalized, a diagnosis of acute appendicitis was made, and operation was performed. At operation a gangrenous area in the cecum on the anterior wall was noted; it measured 4 by 2 cm. The appendix was free and hyperemic. The cecum was sutured to the anterior abdominal wall, the sutures being placed beyond the gangrenous area. The abdominal wall was closed with through-and-through sutures of heavy silk. On the second day the gangrenous area was opened and this was followed by abundant fecal drainage. After 22 days the abdomen was explored, when a mass in the right hepatic flexure was found, about the size of a mandarin with no evidence of metastasis. An ileotransverse colostomy was performed. On the third day the patient had a natural bowel movement. However, on the sixth day he developed phlebitis in the right lower extremity with elevated temperature. This delayed the third operation which was performed after 38 days. At this time a hemicolectomy was performed and patient became ambulant after 16 days.

The pathologic report showed the mass to be an ulcerative infiltrating carcinoma. Two nodes removed in the right angular region showed a simple hyperplastic reaction.

The literature is reviewed and the first similar case was reported by Heschl in 1880. Seventy cases were reported up to 1942. Two theories prevail as to etiology; one is that pressure caused by a stenosing lesion causes a rupture and the other is that pressure causes venous stasis and intraparietal hemorrhage, followed by focal necrosis and subsequent infection leading to perforation. The author states that this case represents the fifth case reported with successful outcome. LUCIAN J. FRONDUTI, M.D.

Rectal Polyps: Diagnosis, 5 Year Follow-Up, and Relation to Carcinoma of the Rectum. JAMES R. COLVERT and CHARLES H. BROWN. *Am. J. M. Sc.*, 1948, 215: 24.

The potential malignancy of benign rectal polyps is a controversial subject. One author found a variation of from 5 to 85 per cent in the malignancy index of rectal polyps, and other writers have contended that the probability of cancer increases with the number of polyps present, approaching 100 per cent in disseminated polyposis. Colvert and Brown observed 235 cases of rectal polyps at the Henry Ford Hospital, Detroit, with a follow-up over a 5 year period of 174 patients. In the present series, rectal polyps were found in 2.3 per cent of routine proctoscopic examinations; nearly three-fourths of these benign lesions were found in patients from 30 to 60 years of age, and 65 per cent of the patients were males.

In nearly all of the cases there were no symptoms due to the polyps, the large majority of patients being examined because of irritable colon distress. Proctoscopy was done in 21 cases because of rectal bleeding (not all of which was due to the polyp), and 9 patients were seen because of rectal discomfort which, the authors believe, was not due to the polyp.

From the foregoing, it is concluded that rectal polyps are essentially asymptomatic, and cannot be diagnosed except by proctoscopy. Barium enemas and, most particularly, the double contrast

method of roentgenographic study, was found to be of importance in revealing colon polyps in addition to those found at proctoscopy.

When neoplastic changes were detected the malignancy was of low grade—frequently of grade 1 and never more than of grade 2.

Of the total number of 235 patients, 176 had their polyps removed. Multiple polyps were demonstrated in 32 patients, and 14 patients had recurrent polyps.

It was found that whereas size and shape were in no way related to the presence of malignancy, ulceration was seen to occur seven times more frequently in malignant than in benign polyps. The total incidence of malignancy for a 5 year period in the patients whose lesions were removed was 8.4 per cent. Cancer was found to be present in 5.9 per cent of initial biopsies, and 2.5 per cent of the patients subsequently developed carcinoma of the rectum. In the group of patients who did not have their polyps removed, the incidence of cancer of the rectum was 6.9 per cent. This last suggests to the authors that malignancy in rectal polyps either develops early or is present from the start, and that there is no evidence that benign adenomas become malignant with the passage of time.

The authors advocate the removal of all rectal polyps, since the determination as to malignancy cannot be otherwise made. The prompt removal of the majority of polyps in this series resulted in a 5 year cure without any major surgery in 13 of 14 patients with malignancy. WAYNE F. CAMERON, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Biliary Tract Surgery in Passavant Memorial Hospital. THOMAS C. DOUGLASS and BENJAMIN F. LOUNSBURY. *Q. Bull. Northwest. Univ. M. School*, 1948, 22: 21.

Seven hundred and twenty-four operations on the biliary tract are reported, among which were 540 cholecystectomies and 32 cholecystostomies. The mortality for all biliary tract operations was 5 per cent. In the cases of cholecystectomy, the mortality was 1.5 per cent, and in the cases of cholecystostomy the mortality was 18.7 per cent.

Carcinoma of the gall bladder or bile ducts was present in 1.9 per cent of all the operative cases.

The omission of drainage did not seem to affect the frequency of complications, nor did it contribute to the mortality. Of the closed wounds, 92.4 per cent healed by primary intention.

Twenty-five per cent of the deaths following cholecystectomy occurred in patients 65 years of age or older, but this group was only 7 per cent of the cholecystectomies. SAMUEL KAHN, M.D.

Hepatic Abscess: Factors Determining Its Localization. THOMAS D. KINNEY and JOSEPH W. FERREBEE. *Arch. Path.*, Chic., 1948, 45: 41.

It has been known since Serege's work in 1901 that the blood in the portal vein is relatively unmixed. The column from the superior mesenteric vein enters the right lobe of the liver and the column from the combined splenic and inferior mesenteric areas enters the left lobe of the liver.

The authors reviewed a series of 39,219 autopsies which disclosed 263 hepatic abscesses. Records for 229 only were complete and these form the basis for this report.

In 136 cases abscesses were present in both the right and left lobes of the liver, in 75 cases the right lobe only was involved, and in 18 cases the left lobe only was involved. The source of the infection is listed for each case.

Infection following common duct obstruction with septicemia was the chief cause of hepatic abscess. Eleven cases were due to abscess primary in the liver. Abscess formation in the left lobe alone was rare and in over half of the instances was due to direct extension of an ulcerating stomach lesion or infection of the lesser peritoneal cavity. There were 12 instances of abscess of the right lobe alone associated with inflammation of the gall bladder.

Hepatic abscesses following appendicitis tended to occur in the right lobe only unless there was an associated portal pyelophlebitis. If this occurs multiple lesions in both lobes usually result.

Abscess of the right lobe alone occurred in 27 patients, in whom the primary focus of infection lay in an area drained by the superior mesenteric vein. Serege's rule appeared to hold with only one exception. In 4 cases the portal blood mixed sufficiently to result in bilateral liver abscesses.

The two lobes of the liver arise from separate outpouchings of the upper enteron and retain anatomic independence particularly with regard to the vasculature. There is evidence that the streams of portal blood coming into the lobes are of somewhat different origin. In man, it is recognized that processes metastasizing via the superior mesenteric vein tend to go to the right lobe, while processes coming from areas of the inferior mesenteric, coronary, and splenic veins go to the left lobe. The short portal trunk, low pressure, and sluggish flow may prevent complete mixing of the blood.

It has been suggested that there is a distinction between the nutritional environments of the two lobes in man. Since portal blood comes to the right lobe from the small intestine predominantly it may be richer in protective protein products of digestion than blood entering the left lobe. Separate catheterizations of the hepatic veins and study of the compositions of the blood leaving the right and left lobes would be of interest and might shed light on this problem. ROBERT R. BIGELOW, M.D.

Cholecystectomy without Drainage (La cholécystectomie sans drainage). P. MALLET-GUY and R. KOPPES. *Lyon chir.*, 1947, 42: 543.

The omission of drainage in 116 cholecystectomies was followed by no instance of hemorrhage, infection, or biliary peritonitis. One patient died from pulmonary embolism, a mortality rate of 0.85 per cent.

The authors contend that omission of drainage following cholecystectomy permits better healing of the wound and a more rapid and satisfactory convalescence. They warn that it is essential to ligate the cystic duct with nonabsorbable material, that no pathologic condition of the cystic duct may exist as it will jeopardize the security of the ligature, and that complete hemostasis of the gall bladder bed should be achieved with the electrocautery.

Forty-nine cases were followed up for a year or more. The results were classified as perfect in 44, good in 2, and mediocre in 3.

EDWARD W. GIBBS, M.D.

Dystonias of the Common Bile Duct (Les dystonies de la voie principale). R. GUILLET. *J. chir.*, Par., 1947, 63: 564.

Following a brief discussion of the anatomy and physiology of the triple system of sphincters of the adult choledochus, it is emphasized that dystonias of the common duct cannot be recognized clinically. Recent radiomanometric studies have shown hypotonias to be almost as common as hypertonias. There are only some 87 cases of hypotension of the choledochus with radiomanometric findings available for study, namely, the series by Mallet-Guy. Dystonia of the sphincter of Oddi is rarely primary, and is usually associated with some pancreatic or biliary lesion. Sphincteric atony may produce pictures not only of pure angiocholitis, but also of medical jaundice, recurrence following cholecystectomy, or even chronic cholecystitis. Pancreatitis of obscure origin must be differentiated from a pancreatic reaction to atony of the sphincter of Oddi. In all of these cases, it is imperative to treat not only the consequences of the atony, but the atony itself.

Caroli's apparatus reveals in cases of hypotonia in this region, subnormal filling, evacuation, and stabilization pressures. Mallet-Guy's apparatus shows a characteristic curve, with a rapid, almost immediate fall in pressure and a subnormal stabilization level of from 8 to 6 cm. or even less. To be valid, this curve must appear unchanged in at least two tracings. The essential roentgen feature is the wide, or even gaping sphincter.

External derivation (cholecystostomy or choledochotomy) may relieve mild dystonias, and affords opportunity for later correction of erroneous diagnoses, but many cases fail to respond to this method. Mallet-Guy suggests sympathetic intervention, with unilateral or bilateral splanchnic infiltration or splanchnicectomy. The latter is most often used unilaterally by the subperitoneal route, is easy and safe, and presents almost no contraindications. It can, moreover, be performed at the same time as exploration of the bile tract.

Medical treatment, duodenal drainage, or even splanchnic infiltration is rarely indicated except in cases showing a barium reflux. In atony associated with angiocholitis, a dilated choledochus, and infected bile, external drainage is in order, but choledochotomy carries the risk of duodenal reflux and is best combined with splanchnic infiltration. Mallet-Guy avoids drainage unless the angiocholitis is very severe, preferring an immediate right splanchnicectomy. Very mild cases may respond to external drainage. When the complication is a calculous cholecystitis, removal is indicated with eventual transcystic drainage or even splanchnicectomy. Cases of "pseudorecurrence" and atony in which both angiocholitis and atony have to be treated by drainage of the choledochus or of the cystic stump (frequently dilated into a "neo-gall bladder") require splanchnic infiltrations or right splanchnicectomy. Atony of the choledochus in medical jaundice likewise requires drainage and eventual intervention on the sympathetic system. In chronic pancreatitis with atony, splanchnicectomy is doubly indicated.

Hypertension of the choledochus leads to stasis with resulting angiocholitis and dilatation of the hepatocholedochus, with final repercussions on the liver cells. Persisting hypertension may produce lesions which maintain and exacerbate the hypertension. Manometrically, purely functional hypertension may respond to vagolytic drugs for a time, or persist and become worse because of local hypertrophy and sclerosis. The only reliable method of diagnosis is radiomanometry.

Hypertension may follow cholecystectomy, or chronic cholecystitis with or without exclusion of the gall bladder, or lithiasis of the common duct. In chronic cholecystitis with exclusion of the gall bladder, a supplementary sphincterotomy will be needed. Cholecystectomy constitutes only a part of the surgical problem in cholelithiasis. The condition of the sphincter of the choledochus will determine the immediate and late results. It is imperative in all cases, following removal of the calculi, to verify the state of the sphincter. Hypertension of the choledochus, especially if associated with sclerosis, may cause biliary fistula or recurrence following external derivation. Radiomanometry may disclose such hypertension as the cause of pseudolithiasic syndromes. Most frequently physiopathologic reverberations of hypertension may be observed in the gall bladder, pancreas, or even in the liver cells. One may thus have to consider atony of the gall bladder, chronic pancreatitis, medical jaundice, or sclerosis of the sphincter in association with hypertension. If sclerosis is present it must be determined whether it be primary or secondary.

Hypertension and sclerosis of the sphincter produce the same symptoms, but the former yields to indirect, medical, or neurolytic methods, while the latter demands direct surgical intervention.

In hypertension of the choledochus or sphincter of Oddi, cholecystography reveals an abnormally tonic gall bladder with visibility of the cystic and even of the common duct following ingestion of a fatty meal. Only radiomanometry will confirm the diagnosis. Manometry by vesicular puncture will not suffice, but with puncture of the choledochus yields characteristic pictures with the Caroli apparatus, showing an abnormally high pressure (above 15 or 16 cm.)

for filling and stabilization. The Mallet-Guy curve is abnormal and the residual pressure above normal. The roentgenographic findings are not pathognomonic. It is only their association or coexistence with radiomanometric findings which serves for diagnosis of hypertension of the common duct. The distinction between pure hypertension and hypertension with sclerosis is extremely difficult. The suspicion of even a beginning sclerosis justifies surgical intervention.

The treatment of hypertension of the choledochus consists of direct or indirect intervention on the sphincter. The former seems most logical; Mallet-Guy's transduodenal sphincterotomy is done with the manometer *in situ*, which aids in localization of the papilla, permits control of division of the sphincter, and avoids complete severance which might lead to reflux and ascending angiocholitis. An infiltration of the vagus nerve during operation may serve to distinguish functional from anatomic hypertension. Even though medical therapy succeeds in a few cases, a correct diagnosis is possible only with interoperative manometry. If the bile tract appears normal, radiomanometric study via puncture of the gall bladder is indicated with suture at the end of the operation—sphincterotomy without drainage. If cholecystectomy is indicated, as for lithiasic cholecystitis, the radiomanometric examination is done via intubation of the cystic duct, which likewise is sutured at the end of the operation; this is likewise sphincterotomy without drainage. However, in the presence of angiocholitis, a drain is inserted into the common duct. Should choledochotomy be indicated following a previous cholecystectomy, the drain is left in the choledochus above the level of the sphincterotomy for 1 or 2 weeks. Medical treatment constitutes an excellent adjunct to external derivation. Failures and recurrences are common after both external and internal derivation. The causal therapy is partial sphincterotomy. Although immediate results are encouraging, late results must await future evaluation.

In generalized atony, unilateral right splanchnicectomy is recommended. The author prefers a direct attack with sphincterotomy under manometric control. Even though generalization of hypertensive phenomena might seem to justify vagotomy, following anesthetic infiltration tests, the possibility of sclerotic lesions indicates the direct attack. Only radiomanometric examination will permit localization of a functional disturbance and occasionally reveal its cause. This diagnostic method constitutes a great step in advance but it may be still further developed. EDITH SCHANCHE MOORE.

The Significance of the Choledochus Syndrome of Villard (Du déterminisme du syndrome cholédocien de Villard). P. MALLET-GUY and R. LACOUR. *Lyon chir.*, 1947, 42: 683.

The triad of pain, fever, and icterus proposed by Villard in 1913 as diagnostic of stone in the common duct was found to be present in 147 of 515 patients complaining of biliary symptoms. Of these, 106 presented the typical triad, 17 exhibited icterus and one of the other two symptoms, and 26 showed in addition to the typical triad either symptoms of angiocholitis or of prolonged persistence of the icterus. The groups are designated, respectively, the typical form, the subdeveloped form, and the reinforced form. With the authors' methods of roentgenologic control and of manometric measurement of pressures in the bile passages, carried out during the operation itself, the presence of stone in the common duct was confirmed at operation in 61 patients who exhibited the syndrome of Villard, either in its typical form (46 cases), subdeveloped form (4 cases), or reinforced form (11 cases). In 14 more instances (12 typical and 2 subdeveloped) there was either positive certainty, or at least strong likelihood that the common duct stone causing the symptoms had passed on into the duodenum. Thus, there was a total of 75 cases (51 per cent) in which the cholelithic significance of the syndrome was confirmed either with certainty or with strong likelihood. Then there were 21 patients (14 per cent) in whom the presence of choledocholithiasis at one time or another was possible, and 51 (35 per cent) in whom a hypothesis of choledocholithiasis seemed unlikely or impossible.

However, although it is shown that there are a large number of conditions other than stone in the common bile duct which can reproduce in whole or in part the syndrome of Villard, the approach is still surgical. It is only when the abdomen is opened and the biliary system exposed that the manometric and roentgenologic controls can be carried out, and only by means of these controls can the diagnosis of calculus or of any other pathologic condition be made with certainty. These controls can be applied in a few minutes, by simple puncture, if the gall bladder appears to be normal, or by intubation of the stump of the cystic duct if the gall bladder must be sacrificed. They will permit the detection of stones which cannot be palpated, such as very small stones at the papilla of Vater which are masked by pancreatic reaction or disease. The methods also assure the removal of the obstruction, and in cases in which stone is not present in the main biliary passage they will obviate an unnecessary choledochotomy. If biliary drainage seems to be the proper treatment for the condition present, transcystic drainage may be simply substituted for the transcystic intubation. JOHN W. BRENNAN, M.D.

Pancreatic Calculi. E. L. ELIASON AND ROBERT F. WELTY. *Ann. Surg.*, 1948, 127: 150.

Pancreatic calculi occur much more commonly than is generally appreciated. They can readily be recognized by roentgenologic examination. Surgical relief can be obtained, and surgery is the procedure of choice in severe cases.

During a 10 year period, from 1936 to 1945, 9 cases of pancreatic calculi were admitted to the services of the senior author at three hospitals. All of the patients were explored. One patient died in this series,

a mortality of 11 per cent. Of the remainder, only one was not definitely benefited, although some continued to have slight residual symptoms.

CHARLES BARON, M.D.

Fibrocystic Disease of the Pancreas: A Review of 14 Cases. DAVID PITT. *Med. J. Australia*, 1948, 1: 91.

The main clinical features of pancreatic fibrocystic disease are undernutrition, steatorrhea, and chronic respiratory infection. The process is essentially a deficiency disease, the deficiency being in the external secretion of the pancreas. Familial and hereditary tendencies are recognized. The central theme of this report concerns the clinical résumé of 14 children manifesting this disease syndrome.

The initial symptoms were abdominal in about half of the cases and respiratory in the remainder. Bowel abnormalities were commonly noted, often with bouts of diarrhea and the passage of large pale stools, usually offensive in odor. Respiratory symptoms included cough, present in some instances since birth. It was usually dry at the onset, becoming moist only when purulent bronchitis or bronchiectasis supervened. Recurrent upper respiratory infections, bronchitis, and bronchopneumonia were almost invariable. Clubbing of the fingers was noted in 8 instances and cyanosis (a bad prognostic sign) was a common feature in advanced cases. Nutrition was uniformly defective, being manifested by celiac facies, potbelly, wasted thighs and buttocks, poor muscle tone, and loss of subcutaneous fat.

In 5 of the 9 fatal cases, enlarged and fatty livers were noted. Other workers have shown that defective pancreatic function is associated with fatty accumulation in the liver, which, in patients who survive, gives place to a multilobular type of coarse cirrhosis.

The clinical diagnosis of fibrocystic disease of the pancreas should be made whenever the celiac syndrome is associated with evidence of lung disease. Estimation of the fat content of the stool should be carried out when clinical suspicion of the disease is aroused. The author mentions multiple diagnostic procedures designed to differentiate fibrocystic disease from celiac disease.

In untreated fibrocystic disease the course is steadily downhill. Just as the pancreatic lesion is progressive, so is the pulmonary condition, and it is this which determines the death of the patient. When the early bronchitic phase is overtaken by the later infective phase, the child is caught in an irreversible chain of events which leads to a fatal termination.

Treatment consists of diet, the administration of pancreatin, a generous vitamin intake, and control of the upper respiratory infections. The caloric intake must be carefully watched and a high caloric, protein rich, and restricted fat diet planned. Vitamin A should be given parenterally, the other vitamins orally. Penicillin and sulfonamide therapy is used for the recurrent pulmonary infections.

ORVILLE F. GRIMES, M.D.

Cystadenoma of the Pancreas. EDWARD E. JEMERIN AND NORMAN A. SAMUELS. *Ann. Surg.*, 1948, 127: 158.

A cystadenoma of the head of the pancreas in a 31 year old female, which had compressed the residual tissue of the head into a thin shell intimately applied to its posterior aspect, was successfully removed. The common bile duct, portal vein, and hepatic artery which were flattened out and bound to the posterior aspect of the mass were dissected free. Of note was the absence of any evidence of common duct or portal vein obstruction despite the marked compression of these structures. The location of this tumor in the head of the pancreas is uncommon in a lesion which in itself is infrequent. The mass was markedly mobile and, because of this and the absence of any suggestive roentgenologic findings, a preoperative diagnosis of pancreatic cyst was not made. The mobility was due to an unusually displaceable duodenum and pancreatic head. It was noted, fluoroscopically, that the duodenum was situated to the left of the midline but as there was no evidence of its compression or distortion, the significance of the finding was not interpreted as suggesting a pancreatic lesion. The tumor itself was firm rather than cystic to palpation, and on section there was a considerable fibrous stroma between the numerous small cysts with a large, central solid mass containing calcific deposits. The epithelium lining the cysts in some areas bore a marked resemblance to endothelium. It is interesting that despite this presence of calcium in the mass no shadow was cast on the roentgenograms even when the films were reviewed in retrospect.

The literature on cystadenoma of the pancreas was reviewed, and the various clinical, pathologic, and surgical features of the lesion were briefly discussed.

CHARLES BARON, M.D.

Spontaneous Rupture of the Malarial Spleen. FALLS B. HERSHEY and JOSEPH M. LUBITZ. *Ann. Surg.*, 1948, 127: 40.

With the large number of malarial cases in the military service, traumatic and spontaneous rupture of the large friable spleen has become more common. The authors in reviewing the literature since 1917 have found 64 cases, and prior to that time 72 cases were reviewed by Leighton. Many of these cases occurred in inoculated paretics.

The authors give a detailed report of the case of a 37 year old veteran who recovered after surgical removal of a spontaneously ruptured malarial spleen.

In the series of 64 cases reviewed, 39 occurred in inoculated patients and 25 in naturally acquired malaria patients. In the inoculation malaria the incidence of rupture varied from 2:101 to 0:5000 cases. Rupture occurred as early as the second day and as late as the fifteenth day of illness in this group. Traumatic rupture of the malarial spleen is very frequent (93 of 123 cases).

Spontaneous rupture of the spleen in naturally acquired malaria is rare. Although rare, prompt diagnosis and treatment will save persons who would

otherwise die. Spontaneous rupture of the spleen has been reported with all species except Plasmodium malariae, the great majority of ruptures occurring in cases with Plasmodium vivax.

The spleens were enlarged, averaging from 450 to 500 gm. Hemoperitoneum was present in all but one case and was almost uniformly due to rupture of the capsule. The pathological descriptions of the spleens were similar and followed the description of the spleen of acute malaria. The authors emphasize how reticular and endothelial hyperplasia obstruct venules and sinuses and cause the interstitial and subcapsular hemorrhages that often lead to rupture.

The mechanism of rupture may be due to (1) local lesions as points of weakness, (2) increase of tension due to hyperplasia and engorgement, and (3) compression by the abdominal musculature.

Arteriosclerotic alterations in vessels, adhesions and thickening of the capsule, interstitial and subcapsular hematomas, focal necroses, changes in fibrous tissue or blood vessels, and great increase in tension within the capsule all may be responsible for the rupture. Vomiting, diarrhea, defecation, and straining all may be of significance.

The signs and symptoms are chiefly those of (1) circulatory effects of acute blood loss, and (2) local abdominal effects of bleeding and rupture. The authors call attention to the different clinical picture in luetics and nonluetics. The luetics were older and afebrile, they had negative abdominal findings and acute malaria, and usually died less than 2 hours after onset of the symptoms, often with no complaints of pain. All but one of the nonsyphilitics had pain and collapse. The onset of rupture was sudden and clear in all but 2 cases. The pain was severe, generalized, and worse in the left or upper abdomen. Kehr's sign was present in only 6 cases. Epigastric abdominal spasm, tenderness, slight abdominal distention, and persistent left flank dullness were the chief abdominal findings. The spleen was palpable in only 5 cases.

Preoperative malarial smears were positive in all 8 cases in which they were made. The white blood counts were low or only slightly elevated. In 5 cases the preoperative hemoglobin was low.

The diagnosis was made preoperatively in only 7 cases and suggested in 2 others. Perforated peptic ulcer, intra-abdominal hemorrhage, ruptured hollow viscus, intra-abdominal abscess, and ruptured uterine tumor were other diagnoses listed. Cerebral malaria and cardiovascular accidents were the most frequent diagnoses made when malaria was known to be present.

The absence of an ulcer history, the normal leucocyte count, plasmodia in the smear, a not exceedingly rigid abdomen, absence of free air under the diaphragm, and physical findings and symptoms pointing to the left upper quadrant are all helpful in differentiating a perforated ulcer.

In the absence of shock and presence of malaria, one must consider perisplenitis, splenic infarction, splenic abscess, and volvulus of the spleen.

The treatment is always surgical as this complication is almost always fatal. Prompt restoration of the blood volume is essential. The operative mortality varies from 26 to 33 per cent in the natural and inoculated malaria. Accurate early diagnosis results in lowered mortality and reduced postoperative complications. Better medical and antishock treatment may improve the surgical mortality.

In this series, 5 patients died and 14 survived. Splenectomy was the treatment in every successful result. Generous blood transfusions have been used recently with success. Adequate medical treatment of the malaria is essential.

ROBERT R. BIGELOW, M.D.

Hemolysis by Splenohemolysin as Manifestation of Splenopathy of Regressive Character (L'emolisi da splenoemolisine come manifestazione di splenopatie a carattere regressivo). C. TARANTINO and F. PASQUINELLI. *Sperimentale*, 1947, 98: 563.

Various theories favoring or criticizing the hypothesis of the existence of hemolysins of splenic origin are discussed by the author.

In patients with splenic disorders a ligation of the splenic artery may replace splenectomy whenever the size of the organ, adhesions, or general condition of the patient preclude removal of the organ.

A diagnosis of Banti's syndrome was made in a 54 year old man with an enlarged spleen, hemolytic icterus, and ascites. A ligation of the splenic artery and omentopexy were performed. The histologic examination confirmed the diagnosis of Banti's disease.

Two months after the operation the patient again developed hemolytic jaundice.

The author concludes from his observations that the spleen secretes a hemolysin which may display its effect in remote areas.

JOSEPH K. NARAT, M.D.

MISCELLANEOUS

The Pneumoperitoneums of Unknown Origin (Les pneumopéritoines d'origine inconnue). GEORGE PRUVOT and LUCIEN LEGER. *J. chir.*, Par., 1947, 63: 632.

Two cases of pneumoperitoneum are reported. The first patient was a 30 year old female who suddenly experienced violent pain in the epigastric region. Under bed rest the pain disappeared except that there was pain on coughing, which radiated to the right shoulder. Roentgen examination disclosed pneumoperitoneum. (The patient had been taking baking soda for about 2 weeks for digestive distress.) Some pain was experienced on palpation in the epigastric and right hypochondral regions. Since the condition did not change in 2 days an exploratory operation was decided upon. This was done under spinal anesthesia. Nothing abnormal was found except the air in the peritoneal cavity; however, during the operation the patient suffered cardiac and respiratory arrest (anesthesia accident) and despite the assistance of a respirator died 4

hours later. At autopsy the duodenum appeared somewhat flaccid, the external surface was ecchymotic and the inner surface was of a dark brownish color. Nothing else seemed to be abnormal.

The second case was that of a 33 year old man. About 2 hours after the evening meal he experienced a sudden violent abdominal pain. This was located mostly on the left side but radiated to the right shoulder. The abdomen became enormously dilated but did not contract. The liver dullness completely disappeared. Palpation provoked a rather severe pain in the right iliac region. Aside from a lead line on the gums and the pneumoperitoneum no other abnormality could be found; however, about a month previously he had had another such pain attack, this time on the right side, with the pain radiating to the left shoulder, and he had vomited and suffered a temporary retention of gas and feces. This time also he had been hospitalized and pneumoperitoneum had been demonstrated roentgenologically. In the second attack operation was decided upon and upon opening of the peritoneal cavity there was a gush of stale smelling gas. The intestines were also somewhat dilated and in the region of the appendix there was a small pool of a slightly turbid fluid with the same stale, unpleasant odor as the gas. The fluid proved sterile and there was no explanation for its origin or for the origin of the pneumoperitoneum. Two months later the patient had another attack of the same general character as the preceding ones, and died without consulting a physician. There was no autopsy.

In connection with these 2 cases the authors reviewed the literature on the subject of pneumoperitoneum and were able to gather 53 fairly comprehensive case reports. In 31 of these operation was done; 20 patients recovered and 11 died. The remaining 22 patients were not operated upon and all recovered except 1, who appeared not to have died of the abdominal condition. These figures do not argue in favor of exclusively medical treatment of pneumoperitoneum; however, they emphasize the urgent need of intense study of the so-called idiopathic form of pneumoperitoneum and the danger of a priori reasoning.

In fact, no one form of etiology seems to explain all cases; some seem reasonably well explained on the basis of a microperforation of the stomach or duodenum, or of tubal antiperistalsis in the female, or of a perforation into the peritoneal cavity of a subcutaneous or mediastinal emphysema, or of the rupture of cystic pneumatosis, or of manual perforations of the uterus or bladder. Yet the abundant occurrence of these etiologic possibilities (except perhaps the cystic pneumatosis), when compared with the rarity of spontaneous pneumoperitoneum, does not argue for any close relationship among them, and the authors believe that it is best to regard pneumoperitoneum as resulting from a number of different etiologic factors until such time when something more can be learned of its pathogenesis.

JOHN W. BRENNAN, M.D.

A Contribution to the Study of Mesenteric Cysts (Contributo allo studio delle cisti del mesentere). GIOVANNI D'ERRICO. *Riforma med.*, 1947, 61: 353.

A review of the literature is presented and mesenteric cysts are classified according to Bonaccorsi into lymphatic, embryonal, and parasitic types. The author then gives a description of all these types and discusses their etiopathogenesis and pathological anatomy. Two case reports are presented, one of a lymphatic cyst found while operating for an ovarian cyst; both cysts were excised. The second report was of a dermoid cyst. The clinical signs were described, they being essentially those of a freely movable mass in the right side lateral to the umbilicus.

The number of reported cases according to Custer, Kellner, and Escue is less than 400 (1946).

LUCIAN J. FRONDUTI, M.D.

One Hundred and Thirty-Seven Consecutive Combined Abdominoperineal Resections without Mortality. THOMAS E. JONES, JOHN R. ROBINSON, and GARNER B. MEADS. *Arch. Surg.*, 1948, 56: 109.

Since the treatment of carcinoma of the rectum is still a controversial subject in the medical literature, the authors presented a study of 137 consecutive combined abdominoperineal resections of the rectum without operative mortality as a contribution to the growing weight of evidence in favor of the one stage combined abdominoperineal resection, as contrasted with operations of lesser magnitude. A Miles type of operation was performed in all cases under spinal anesthesia. The wounds were closed primarily with alloy steel wire sutures. No sulfonamides or antibiotics were employed in the preparation of the patients or at the time of operation.

Of interest is the observation that 28 of the patients complained of hemorrhoids within a period of about 6 months prior to the diagnosis of a malignant growth, and in 75 per cent of these hemorrhoidectomy had been performed in the same period.

There is no standard set of symptoms for rectal carcinoma; the patient's history alone is unreliable. The duration of symptoms before a proper diagnosis is made depends on 3 factors: (1) the patient's neglect in not consulting a physician before the condition is in a far advanced stage, (2) disregard of good medical advice, and (3) improper diagnosis of the condition in its early stages. The greatest number of patients in this group (75 per cent) had symptoms for 9 months or longer; only 25 per cent had symptoms from 1 to 9 months.

A palpable rectal lesion was elicited on digital examination in 120 patients (87 per cent); in only 18 patients (13 per cent) was a sigmoidoscopy required in making the diagnosis. The sigmoidoscope was otherwise utilized to determine the amount of circumference of the rectum involved by the lesion, the amount of fixation of the lesion, the character and type of ulceration of the mucosa, and the distance of ulceration from the mucocutaneous junction.

Biopsy was carried out only once in the present series. The authors are not of the opinion that bi-

opsy is necessary since the diagnosis can be made on gross appearance of the lesion, and it may even be misleading. Often, biopsies of superficial tissue do not reveal the disease when a biopsy of tissue from deep in the tumor would.

Preoperative fixation was noted in 41 cases (29 per cent), but fixation at operation was encountered in only 38 (about 27 per cent). In 14 of these it was necessary to remove a portion of the prostate with the rectal growth. Radium seeds were implanted into this prostatic bed, or in the surrounding tissue, in 6 of the 14 patients. Nodules in the liver were encountered in 9 cases. Metastatic glands were found in 4 patients in whom the operation was performed primarily for the comfort of the patient.

The most important indication of the patient's condition during operation was the pulse rate. Increases in pulse rate were viewed with much more alarm than drops in blood pressure.

In 3 cases, two separate lesions were found in the same specimen, the lesions in 2 patients being an adenocarcinoma in the rectum and a squamous cell carcinoma at the mucocutaneous junction. Mucosal polyps separate from the malignant lesion were found in 30 cases (22 per cent). In 8 of these there were multiple mucosal polyps. The pathologic classification and the number of the lesions were: 125 adenocarcinomas (90 per cent); 5 medullary carcinomas (4 per cent); 4 squamous cell carcinomas (3 per cent), and 4 benign papillomas with malignant change (3 per cent).

The entire series of lymphatic nodes was involved in 7 cases (5 per cent). The perirectal fat only was involved in 49 cases (35 per cent). The fat and nodes were both involved in 67 cases (40 per cent). In 15 cases, there was no involvement of the fat or nodes. In the smallest lesion there was no involvement of the fat but there was involvement of 14 per cent of the nodes; in the largest lesion there was involvement of fat but no involvement of nodes. Hence, the relationship of the size of the lesion to its spread to the surrounding structures remains undetermined.

The authors believe that the one factor responsible for a marked reduction of complications is the employment of alloy steel wire sutures through all layers in closing the abdominal wound. Infection of abdominal wounds occurred in only 3 cases (2 per cent). The other factors in lessening complications were (1) the avoidance of stay sutures of any type, and (2) the avoidance of suturing the serosa of the bowel to the peritoneum or the abdominal wall.

An uneventful postoperative course, except for disturbances of the urinary tract, occurred in 68 cases (48 per cent). Mild obstruction of the small intestines or paralytic ileus developed in 13 cases (9 per cent) and was relieved in all cases but one by the use of the Miller-Abbott tube; enterostomy for relief was required in the one exception. Pulmonary infarction occurred in 2 patients and atelectasis in 4. Mild infection of the posterior wound occurred four times. A fistula in the posterior vaginal wall also occurred in 4 cases. Infection of the urinary tract and retention of urine were very troublesome and most consistent.

The reviewer desires to call particular attention to the departure by the authors from the generally accepted preoperative use of sparingly absorbable sulfonamide drugs and the omission of biopsies.

In the discussion of this paper, MADDOCK stated that while cancer is a disease that is never treated too early and seldom too radically, yet he is dissatisfied with the opinion that all rectal carcinomas should be subjected to a Miles' procedure with the consequent loss of the anal sphincteric control. It is his belief that in patients with liver metastases the function of the sphincter should be preserved as the length of life in these patients is relatively short.

ROBERT TURELL, M.D.

GYNECOLOGY

UTERUS

A Method of Study of the Uterine Canal. W. B. NORMENT. *South. Surgeon*, 1947, 13: 885.

This article deals entirely with the diagnosis of submucosal myomas, polyps, and malignancy of the fundus of the uterus by means of hysterograms and direct observation. Since the uterus is such a common site of polyps and submucosal myomas it would seem that a hysterogram should be almost a routine requirement in case of irregular uterine bleeding.

The objections to the use of iodized oils are overcome by the use of rayopake. This product is an opaque contrast medium containing an organic iodine compound and a polymetric form of alcohol. The author uses a plastic cannula which is semipliable and nonopaque. The technique of injection is presented.

The second method of study is by direct vision and indirect vision. This is more useful in detection of carcinoma of the fundus of the uterus. The instruments consist of a transparent plastic sheath and an optical instrument which is inserted into the plastic tube. Some type of anesthesia must be given. The cervical canal is dilated and the plastic tube with the optical instrument is inserted into the uterus. If it is sufficiently evident that carcinoma is present, then curettage is not necessary. If there is doubt, curettage should be performed.

This method of study of the uterine canal, by hysterogram with rayopake, direct and indirect vision combined, will aid greatly in the diagnosis of benign and malignant growths of the uterus, with greater safety to the patient. T. FLOYD BELL, M.D.

Contribution to the Study of Uterine Cysts (Contributo allo studio delle cisti dell'utero). PIETRO QUINTO. *Riv. ital. gin.*, 1947, 30: 3.

The author divides these rare cysts into true cysts, in which a preformed wall covered by epithelial or endothelial tissue delimits a closed cavity entirely or partially filled with varying material, and pseudocysts, in which the wall of the abnormal closed cavity consists of connective and fibromuscular tissue or of tissue proper to a neoplastic, fibromyomatous, or sarcomatous formation which has undergone cystic transformation. He classifies true cysts into retention cysts; lymphatic cysts; dermoid cysts; embryonal cysts, which include those from ectopic residues of Wolff's bodies, remnants of the Malpighi-Gartner canal, and anomalies of development of Mueller's ducts; cysts due to epithelial dystopias and discovered at various periods in life; and aberration cysts caused by invagination of the peritoneal epithelium. He reports 2 cases of histologically proved true cysts of the uterus: the first was classified among those of muellerian origin, and the second was considered as a peculiar type of lymphatic cyst.

In the first case the large cyst had the appearance of an accessory uterine cavity. Because of its site and the absence of any particular structure, as the cyst did not originate from remnants of Wolff's bodies or of the Malpighi-Gartner ducts, or from inclusion of epithelial elements of the peritoneal serosa or endometrial aberrations (the cyst was clearly separated from the uterine cavity by a special layer), it seemed evident that it had originated from remnants of Mueller's ducts. This had taken place by means of diverticula which had lost their primary connection with the mucosa, or defects of scission or of fusion of the two ducts which had remained enclosed in the muscular layer of an apparently well formed uterus. The cyst had nearly all the anatomohistologic characteristics of muellerian cysts: median location, delimitation by the fibromuscular walls like those which should constitute the true walls of the muellerian canal, internal lining with cylindrical, cubical, flat, and stratified pavimentous epithelium with well marked deformities, the presence of numerous true papillas, the presence of smooth fibromuscular cells in the wall of the cyst, and, finally, a viscous serosanguineous fluid content. Among all these characteristics, the true papillas and the evident deformities of the lining epithelium are those which justify the classification because they serve to differentiate cysts of muellerian origin from those due to remnants of the ducts of Wolff and of Malpighi-Gartner.

In the second case the large cystic cavity was made irregular by the presence of remnants of old destroyed septa, the walls of which were lined by an interrupted layer of endothelial elements resting on a thick lamina of tissue having a fibrillary structure, rich in lymphatic, partly dilated spaces and muscular fibers beyond which the uterine musculature was thinned by the distention of the cyst under the pressure exercised by its liquid contents.

From the clinical point of view, the two cases offered no help for the diagnosis, the difficulties of which are practically insuperable because of the absence of specific history and of subjective and objective pathognomonic data. In fact, even if the objective examination suggests a genital cystic tumor, it will not always be easy to determine whether it is an ovarian or paraovarian cyst, a hydrosalpinx or a hematosalpinx, or a uterine tumor and, in this case, whether it is a cyst or a pseudocyst. In general, cysts and pseudocysts of small size pass unobserved or are mistaken for fibrous nodules, while those of marked size are confused with more common uterine or parauterine conditions and even with pregnancy. But except for the possibility of confusion with pregnancy and the consequences which may derive from it, missing the correct diagnosis is of little importance because the conditions which simulate uterine cyst lead to the same surgical treatment. Surgery is absolutely indicated because the evolution of these

benign tumors is not exempt from possible serious complications which include rupture, suppuration, axial torsion of the uterus, and grave cardiac disturbances in exaggerated development of the cyst. According to the findings, the intervention may consist of subtotal or total hysterectomy, or simple removal of the cystic formation; generally, if the operation is performed in time, before the occurrence of complications, it does not offer any difficulties and carries a favorable prognosis. RICHARD KEMEL, M.D.

Ectodermal Invasion of the Myometrium (L'invasione ectodermale del miometrio). LUIGI DE GIORGI. *Arch. ostet. gin.*, 1947, 52: 211.

The terms "ectodermal invasion" and chorionic infiltration are not synonyms, but refer to different anatomical substrata and have a different meaning. By the latter the author means various morbid processes such as placenta accreta, and he defines the former (in accord with Poso) as that morbid process characterized by "dissemination of derivatives of the chorionic ectoderm in the maternal structure to such an extent that, even when the uterus is completely freed of the ovum, a large part of the element remains in the placental area." This morbid process is called "syncytial endometritis" by Ewing and "atypical chorioepithelioma" by Marchand.

The author reports the case of a multipara, 45 years old, who, following an amenorrhea of 2 months, expelled from the uterus a mass (a vesicular mole), which was followed by a persistent metrorrhagia. After surgical intervention, i.e. total abdominal hysterectomy and bilateral adnexectomy, the patient recovered completely. Macroscopically, the uterus revealed on the posterior wall toward the fundus an area irregular in shape and dark red in color, which was considered to be the nidus of the ovum. Microscopically, the dominant features were ectodermal elements, mostly in colonies, occasionally scattered and characterized by zonal disposition with extension in the myometrium, nuclear and protoplasmic areas of regression and regeneration, leucocytic infiltration, and glandular elements. These areas were defined by the author as areas of endometriosis.

In the interpretation of the case, the most important facts to consider are the quantity, quality, and extension of the ectodermal elements and the complete absence of any vestige of villi. This excludes the possibility of postabortive endometritis.

The theory that the ectodermal elements suggest a neoplastic growth is refuted by the absence of atypical cells which usually invade the chorioepitheliomatous centers and which represent active or degenerative centers of the blastomatosis. It is also to be noted that there is a lack of inflammatory reaction superimposed on the ectodermal elements. Another important observation is the predominance of various stages of protoplasmic and nuclear degeneration which suggests the regressive characteristics of the lesion. The lesion therefore must not be regarded as a "syncytioma," or "syncytial endometritis," which is a transitional lesion with definite neoplastic characteristics. Correct interpretation of the case leads to correct therapy. In this case radical surgery was suggested by the multiparity of the patient and the uterine metritis as disclosed by the histological examination of the uterine scrapings.

"Chorionic invasion of the endometrium" signifies a uterochorionic pathological process found at any stage of pregnancy. It is characterized anatomically by a quantitative abundance of chorionic elements interspersed with areas of degeneration in the decidua basalis and in that part of the myometrium corresponding to the situs placentaris. Inflammatory changes and phenomena of necrosis and hemorrhage are also present. It is a regressive process and not a neoplasm of the chorioepitheliomatous type. JOSEPH M. A. PAPE, M. D.

Atypical Endometrial Hyperplasia Simulating Adenocarcinoma. EMIL NOVAK AND FELIX RUTLEDGE. *Am. J. Obst.*, 1948, 55: 46.

The purpose of this article is to call attention to a group of benign hyperplastic lesions of the endometrium which may be and often have been mistaken for adenocarcinoma. While these lesions are actually hyperplastic in a general pathological sense, they are very different in their histologic characteristics from the ordinary type of benign endometrial hyperplasia. The latter term has come to have reference in gynecologic literature to the Swiss-cheese type of endometrium, characterized especially by disparity in the size of the glands, some being large and cystic, and some small, with a rather abundant, compact stroma. The authors emphasize that the histologic picture presented by the ordinary Swiss-cheese hyperplasia does not in the slightest degree resemble that of adenocarcinoma. Also, the ordinary hyperplasia as observed during reproductive life has no tendency toward malignant transformation.

The histologic appearance of any part of the endometrium is determined not only by the hormonal influence to which it is subjected, but also by its own degree of sensitivity or refractoriness to the hormones in question. The degree of maturity or immaturity, ripeness or unripeness of the endometrium, appears to be the most important factor in determining the degree of its receptivity to the ovarian hormones. The simple type of Swiss-cheese hyperplasia does not represent the only abnormal endometrial pattern which may be produced by excessive or prolonged estrogen stimulation. This atypical hyperplasia may be fairly uniform throughout the endometrium, but more frequently the atypical lesion occurs in one or in many localized areas of an endometrium which otherwise presents an obviously benign Swiss-cheese picture. The authors believe that these abnormal cancerlike areas represent different degree or types of estrogen effect upon areas which respond differently to the same estrogen growth stimulus. This conclusion carries with it also the connotation that such areas are not histologically indicative of malignancy.

Some of the atypical proliferative patterns which may lead to the incorrect diagnosis of carcinoma are given as: (1) increased number, crowding, and moderate atypicalness of the glands; (2) stratification, abnormal staining, and atypical morphology of the epithelium; and (3) the presence of squamous plaques in the walls of the glands, and occasionally on the surface. These atypical patterns are discussed and illustrated.

The material forming the immediate basis for this study consisted of a group of cases, 44 in all, which showed atypical hyperplastic changes which might readily be mistaken for adenocarcinoma, and were selected from a considerably larger group exhibiting less pronounced atypical pictures which few would interpret as malignant. JOHN R. WOLFF, M.D.

Ultimate Results in Irradiation Treatment of Cancer of the Uterine Cervix (Sui risultati a distanza del trattamento attinico del carcinoma del collo dell' utero). EMILIO ROBECCHI. *Ginecologia*, Tor., 1947, 13: 306.

The author reports on 92 cases in which irradiation treatment was given for cancer of the uterine cervix in the period from January 1, 1934 to December 31, 1942. Eighty of these could be followed up from 3 to 12 years; those not followed up were simply figured as deaths. According to the Geneva classification, 22.8 per cent of the cancers were adjudged as in the first stage, 23.9 per cent in the second, 51 per cent in the third, and 2.1 per cent in the fourth. By this classification the first two stages are regarded as operable and the last two as inoperable. The youngest patient was 31 years old and the oldest 66. Those regarded as operable were given the combined treatment with surgery and irradiation; the rest were given irradiation therapy alone. The latter method consisted of endocervical (10 mgm.) and vaginal (15 mgm.) applications of radium for a period of 8 days (total 4,800 mgm. hours) and then roentgen irradiation in doses of from 800 to 1,500 roentgens per field. There were two anterior and two posterior fields (rarely two transtrochanteric fields) for a total dosage of from 3,200 to 6,000 roentgens. This course was repeated a second and third time at later periods.

After a period of 5 years' observation 60 per cent of the patients in the first stage, 50 per cent in the second stage, 21.6 per cent in the third stage, and none in the fourth stage were still living. In those under observation for less than 5 years there were 6 in the first stage (3 living, 2 dead, 1 lost to follow up); 6 in the second stage (1 living and 5 dead), and 10 in the third stage (2 living, 6 dead, 2 lost to follow up). There were only 2 patients who were in the fourth stage; one of these died in 5 months and the other died a year later. Of course, not all of the decedents died of their cancer; at least one is known to have died in an air raid and another of a pulmonary infection.

Thus, among the total 92 patients there were 25 with 5 year survivals; and although one did die after 6 years and another after 8 years, the results obtained at this clinic (University of Torino, Italy) are regarded as exceptionally good.

The author regards the most important field for investigation at this time as that of earlier recognition of cervical cancer. JOHN W. BRENNAN, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Concerning Salpingography (Ueber die Salpingographia). HEINRICH MARTIUS. *Deut. med Wschr.*, 1947, 72: 657.

The author discusses the relative merits of the injection of air to test tubal patency versus the use of an iodized oil, and the roentgenological demonstration of the hysterotubal tract. He calls attention to the fact that the patient presenting herself for the diagnosis of sterility is an otherwise normal person, and, therefore, must be treated in a manner which will not do her any manner of harm. He believes that, in general, the injection of air is a far more innocuous procedure than the injection of the contrast medium. He believes that the larger number of complications reported following the former procedure is due to the fact that it is so frequently carried out in the offices of other than competent technicians, and that it is all too often viewed as a simple office procedure.

One case is cited in which there were adhesions evidently following a hysterosalpingogram, and that separation of the adhesions disclosed small yellow masses which he believed were remnants of the iodized oil. The use of urographic media in water solutions has not been successful in his hands because of the lack of viscosity and rapid emptying from the fallopian tubes. Furthermore, he believes that the radiation incident to the filming of the area should not be considered too lightly, and that this may well cause harm to the ovaries and to the maturing ovum.

The author also points out that either procedure must be preceded by a careful gynecological examination made both manually and by observation through a speculum. He believes that as a therapeutic procedure the injection of air is preferable, as the iodized oil may of itself set up an inflammatory process, although this will probably take place only in an already diseased tube. WILLIAM C. BECK, M.D.

Studies of the Human Corpus Luteum. JOHN I. BREWER AND HAROLD O. JONES. *Am. J. Obst.*, 1948, 55: 18.

The purpose of this article is to present a histologic study of corpora lutea and endometrium in instances of functional uterine bleeding, and to discuss the relationships of these two tissues. Specimens are described and interpreted. The specimens in each instance were obtained by hysterectomy and oophorectomy or by resection of the corpus luteum. The operations were performed during the bleeding phase, since it is during this period that most accurate interpretations can be made.

The authors found that functional uterine bleeding may occur when a corpus luteum is present in the ovary. The endometrium in some instances may evidence irregular regression. The irregular regression is the result of prolonged life and function of the corpus luteum. The endometrial picture will vary, depending upon the rate and extent of regression of the corpus luteum. The bleeding which occurs seems to be an exaggeration of the normal bleeding processes observed in cyclic menstruation.

The corpus luteum in other instances may be histologically and functionally normal. The endometrium, except in small regions, responds normally. It is from these small regions that bleeding occurs. The bleeding in these instances is independent of the corpus luteum and of the remainder of the endometrium. The bleeding is unlike the usual normal menstrual bleeding. It is localized bleeding from blood sinuses with scant loss of endometrial tissues. During this type of bleeding ovulation can occur, corpus luteum development can progress normally, and the endometrium not involved in the bleeding can develop normally. The phenomena that occur that produce the bleeding in such instances are not known. The explanation may reside in a local bleeding factor in the endometrium or in the local abnormality of response of the endometrium.

JOHN R. WOLFF, M.D.

EXTERNAL GENITALIA

High Lymphadenectomy and Sympathectomy in Carcinoma of the Vulva. EDWIN M. ROBERTSON. *Am. J. Obst.*, 1948, 55: 79.

The successful treatment of carcinoma of the vulva differs in no way from that of carcinoma in other sites in that the primary lesion, the spreading growth, and the metastases in lymph nodes must be completely destroyed or eradicated.

Because the malignant vulvar tumor is situated on a part of the body which has an enormously widespread lymph drainage system, the exact limits of surgical excision required are difficult to estimate, as are the sites and dosage of radiation. However, it seems that the radiation therapy of vulva carcinoma and lymph node metastases, in the groin for example, is more limited than surgical excision of the affected parts and therefore vulvectomy and lymphadenectomy are the more favored procedures.

The author reports a case of carcinoma of the vulva occurring in a woman 37 years of age, for which wide vulvectomy, bilateral inguinal and pelvic lymphadenectomy, right lumbar lymphadenectomy, and lumbar sympathectomy were performed. The procedures are described.

It was not without very careful consideration that the accepted limits of surgical treatment of vulvar carcinoma were exceeded in this case, but the relative youth of the patient, the large size and prolonged history of the growth, confidence in the safety of modern surgical procedures to avoid shock and infection, and a hopeful confidence, perhaps quite misplaced, in concomitant sympathectomy as a means of lessening the chance of development of thrombosis and embolism were strong impelling influences.

JOHN R. WOLFF, M.D.

MISCELLANEOUS

The Detailed Anatomy of the Paraurethral Ducts in the Adult Human Female. JOHN W. HUFFMAN. *Am. J. Obst.*, 1948, 55: 86.

Skene's presentation in 1880 established the clinical significance of the paraurethral ducts. However, the extent and the detailed anatomy of these structures still remain a controversial matter, and a review of the present day literature confirms Everett's statement that there is no unanimity of opinion on the subject of paraurethral and urethral glands. The purpose of this presentation is to describe the paraurethral ducts and glands of several adult human females in an effort to portray, at least in part, the anatomy of the prostatic homologue in the female.

The material studied consisted of serial sections and wax model reconstructions of adult human female urethras. As a result of this study, a concept of the anatomy and histology of the paraurethral ducts is presented. It would appear that these ducts are not constant in number or location; that they not only form extensive ramifications throughout the tissues about the distal urethra, but that they may also extend to within a short distance of the bladder; and that the often numerous ducts terminate in tubular glands which are lined for the most part by columnar epithelium. This epithelium has some, although limited, secretory activity.

The role which the paraurethral ducts may play in the etiology of lesions of the urethra and anterior vaginal wall is discussed.

JOHN R. WOLFF, M.D.

Tumorlike Scleroses in the Submucous Connective Tissues of the Urethra in Women following Castration of the Menopause (Scléroses sous-urétrales pseudo-tumorales chez la femme castrée ou ménopausée). M. CHAMPEAU. *Rev. chir.*, Par., 1948, 67: 59.

A 75 year old woman, of fastidious personal habits, had been suffering for about 2 months from delay, slender stream, and terminal dribbling with urination. There was some frequency of urination, especially at night. There had also been some bleeding from the urethra. A thickened, dense mass was found, extending the length of the urethra between this structure and the anterior vaginal mucosa. The mass was molded to the curvature of the urethral lumen. There was some eversion of the meatal mucosa (bleeding). Following a preliminary cystostomy the supposed tumor was easily excised and found to be composed exclusively of dense connective tissue. Four years later the condition recurred, minus the bleeding. The urinary troubles were not so bad as originally.

Three other identical conditions have since been encountered; one in a 52 year old female who had

undergone a hysterectomy 4 years previously, another in a 61 year old woman in menopause for 10 years, and the third in a 46 year old woman who had undergone bilateral ovariectomy 4 years previously. In the last instance the condition was causing no symptoms.

In the 52 year old patient the mass was again easily excised and again it returned after 2 years, despite vigorous treatment with estrogens and progesterone, including an implantation of 100 mgm. of folliculine.

In the 61 year old patient the sex hormones were again without effect and the mass was excised, this time with difficulty, which resulted in a small fistula that healed spontaneously after 3 weeks' time. The patient did not return.

In the last patient the mass was not removed but later a hysterectomy was done and after that the urinary difficulties disappeared, the tumor remaining unchanged.

The author believes this condition to be a hitherto undescribed manifestation of sex hormone deficiency and recommends prophylactic treatment with ovarian hormones in high dosage.

JOHN W. BRENNAN, M.D.

Care of Patients with Advanced Pelvic Cancer. WILLIAM E. COSTOLOW. *Radiology*, 1948, 50: 3.

The author presents some generalized recommendations concerning advanced pelvic carcinoma.

Primary carcinoma of the vagina is considered by him a radiological problem at any stage, and from 85 to 90 per cent of all grades of cervical carcinoma are also considered entirely radiological problems. From 10 to 15 per cent of the cases are in stage I, and, thus, may be considered operative. It is the author's belief that the operable types of corpus carcinoma should be given radium preoperatively.

The author believes that pelvic carcinoma should be considered a major medical and surgical problem. Attempts should be made to eradicate infection before treatment is commenced. Douches, sulfonamide drugs, penicillin, and transfusions should be resorted to. X-ray therapy often aids in removing infection. Proper care regarding filtration, careful packing of the bladder and rectum away from the applicator, and the use of retention catheters aid greatly in this type of cancer therapy.

The most common complications in this region of the abdomen are cystitis and proctitis. Vesicovaginal fistula occurs occasionally. Ureteral obstruction, when present, is almost always due to neoplastic disease, but sometimes it is due to scar tissue in the parametrium. When severe pain complicates the picture, such surgical procedures as posterior rhizotomy, anterolateral cordotomy, and presacral nerve section are recommended.

The radiation therapist should follow his patient up in co-operation with a general physician. There is increasing need for physicians thoroughly trained in cancer therapy who will follow up the advanced as well as the early case and thus administer the aid and palliation the patient needs.

HENRY C. FALK, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

A Clinical and Histopathologic Study of Lesions of the Cervix Uteri during Pregnancy. C. F. FLUHMANN. *Am. J. Obst.*, 1948, 55: 133.

An important feature of prenatal care is a careful inspection of the cervix uteri. This procedure often reveals pathologic lesions which exist with or without symptoms, such as vaginal bleeding, and demand immediate attention. The object of this study is to present an analysis of the histopathologic findings in a series of 89 cases in which a gross abnormality was recognized, and a biopsy of the cervix was obtained or a hysterectomy was performed. All stages of gestation are represented.

Gross and histopathologic examination revealed that mucous polyps of the cervix were found in 37 cases, erosion of the cervix in 32, carcinoma of the cervix in 10, condlyoma acuminata in 5, endometrial polyps in 3, and leucoplakia in 2.

The generally accepted description of the cervix during gestation is that presented by Stieve in 1927. The most prominent changes are to be found mainly in the connective tissue elements during the first 2½ months. There is a tremendous increase in the number of blood and lymphatic vessels which continues throughout the whole of pregnancy, so that eventually the cervix becomes a soft boggy structure comparable to erectile tissue. There is an increased activity of the cervical glands which is progressive throughout pregnancy, but does not become marked until after the twelfth week. From then on the glands increase in number, invade the substance of the cervix, and project into the cervical canal.

The gross and microscopic appearance of cervical erosion is described, and its etiology is discussed. The present concept, advanced by Meyer and others, that all erosions should be considered the result of infection, is not supported by the author's histopathologic analysis which suggests that these lesions should be considered as adenomas of the cervix. Extensive cervicitis was present in only 9 instances.

Although the largest group of lesions in the series were mucous polyps, originating either from the external os or from the cervical canal, bleeding occurred in only 6 instances.

Hyperactivity of the basal cell layers of the squamous epithelium and epidermidalization occurred both in so-called erosions and in some mucous polyps. These abnormal proliferations are especially prone to occur during pregnancy and, consequently, there is here a wide field for further investigation and observation, in view of the search for methods dealing with the recognition of early carcinomatous changes.

The subject of cancer of the cervix uteri during pregnancy is far beyond the limits of this article, but as a matter of record, some details are given of the 10 cases of carcinoma of the cervix uteri during pregnancy observed in the Department of Obstetrics and Gynecology at the Stanford Medical School, San Francisco, California. JOHN R. WOLFF, M.D.

LABOR AND ITS COMPLICATIONS

The Expectant Management of Placenta Previa. TIFFANY J. WILLIAMS. *Am. J. Obst.*, 1948, 55: 169.

The maternal mortality in placenta previa has been appreciably reduced in the past decade, mainly by the replacement of blood loss by adequate transfusions of whole blood. On the other hand, fetal mortality remains high, in a great measure because of prematurity. In order to improve the fetal results, it is necessary to carry these patients closer to term. Ample, properly matched blood, and caution in the use of vaginal manipulations may make it possible to continue the pregnancy until the child is larger, and so increase the fetal salvage.

The author presents the results in 105 cases of placenta previa seen at the University of Virginia Hospital, Charlottesville, during the past 11 years. Forty-one of these patients were treated in an expectant manner. Obviously, there can be no expectant treatment once labor has begun. Likewise, if the patient is at or near term, there is no advantage in attempting to prolong the pregnancy.

Placenta previa requires hospitalization for diagnosis and treatment. In the event that the child seems too small to survive, and if labor has not begun, an expectant attitude may be adopted. A gentle examination and inspection of the vagina and cervix may be done to eliminate the possibility of some infrequent cause of bleeding such as ruptured varices, or cervical tumors, but the cervical canal should not be explored. These patients should be kept under observation, as were 41 patients in the authors series, for periods of time varying from 2 days to 3 months in an effort to obtain a child which will survive. Five of the babies (12%) borne by these 41 patients were lost; one of these was delivered at term by cesarean section and died neonatally of congenital malformation, and 4 were born prematurely—one a stillborn and 3 dying neonatally. The fetal mortality in this group, who were treated expectantly, is considerably better than the fetal mortality of 28 per cent for the entire series.

The preferred methods of delivery were either cesarean section or induction of labor by rupture of the membranes, according to the station of the presenting part, the degree of previa, and the condition of the cervix. The one maternal death is reviewed.

The author concludes that an attempt to carry patients with placenta previa to term seems to be reasonably safe and is worthy of trial, although some of them will go into spontaneous labor prematurely, while others will have such persistent or profuse

bleeding that one is reluctant to continue an expectant attitude. JOHN R. WOLFF, M.D.

Functional Dystocia following Cesarean Section through a Transverse Incision of the Lower Segment (Distocia funzionale conseguente a taglio cesareo con incisione transversale del segmento inferiore). GIOVANNI PAROLI. *Riv. ostet. gin.*, 1947, 2: 244.

A surgical problem, always interesting and always open to discussion, is whether a longitudinal or a transverse incision through the lower uterine segment is preferable in performing a cesarean section.

The transverse incision, with modifications is held to be anatomically correct by most authorities. In the lower uterine segment, the majority of the muscle fibers run in a horizontal plane as do most of the blood vessels. A curved incision with the convexity downward is supposed to cause destruction of fewer anatomical structures.

Most authorities agree that regardless of the operative method, the immediate results (danger to mother and fetus) and the remote results (resistance of the uterine scar in subsequent pregnancies) are equally good whether the longitudinal or the transverse incision is used.

Few reports have been made on the effects of cesarean section by the two methods on the functional activity in subsequent pregnancies, e.g., motor activity and other dynamic phenomena.

In this regard, 2 cases of dynamic dystocia following cesarean section through a transverse incision are reported and discussed.

The first case reported by the author was that of a 33 year old woman who was operated on by cesarean section through a transverse incision to terminate her fourth pregnancy on account of placenta previa. She had formerly had three normal deliveries. The postoperative course of the cesarean section was complicated by suppuration of the operative wound. A year after the section, the patient entered the hospital in labor with the fetus in a vertex presentation, the head not descending although the uterine contractions were strong. After 8 hours of labor the cervical dilatation was 5 cm. and the cervix was flexible. In spite of the soft sensation, the cervix was asymmetrically dilated. The posterior lip of the cervix was more dilated than the anterior lip and during strong and regular uterine contractions the posterior lip stretched, while the anterior one appeared flaccid and inert. After another hour of good contractions, with pain essentially limited to the suprapubic region, the local situation remained the same, notwithstanding the fact that the fetal membranes had already ruptured. A diagnosis was made of arrested descent of the head and faulty cervical dilatation due to functional motor dystocia of the uterus. Manual dilatation was carried out and a classical podalic version was done without anesthesia. With the hand in the uterus while turning the fetus, a rigid semilunar band was felt in the anterior uterine wall at the site of the scar of the former transverse cesarean section. A living fetus, weighing 3,800 gm., was delivered.

Three years later, the patient returned to the hospital 9 months pregnant. Dilatation of the cervix was incomplete. Manual dilatation was easily carried out. The head of the fetus was engaged, forceps were applied, and a living fetus weighing 2,900 gm., was successfully delivered. The puerperium was normal.

Dynamic dystocia thus occurred in 2 successive pregnancies in a multipara, who had formerly had 3 normal pregnancies and a fourth pregnancy terminated by transverse cesarean section.

The second case, presented by the author, was that of a woman of 32 years, who had undergone a transverse cesarean section to terminate her first pregnancy on account of a prolapsed cord. The postoperative course was complicated by suppuration of the operative wound. She entered the hospital for the delivery of her second child, the latter being in the oblique position. About one hour after entry, the fetal membranes ruptured spontaneously. The uterine contractions were regular with complaint of pain in the suprapubic region. After 7 hours the cervix was dilated to the breadth of two fingers. After 18 hours, notwithstanding strong uterine contractions, the dilatation was only 5 cm. with the anterior lip inert. The cervix was dilated manually, forceps were applied, and delivery of a living fetus weighing 3,200 gm. was accomplished.

Outstanding features common to both of these cases were difficult and incomplete dilatation of the cervix in spite of apparently normal uterine contractions without signs of cervical spasm; difficult engagement of the fetal head with lack of progress of the presenting part; the presence of suprapubic pain during uterine contractions instead of pain usually referred to the lumbosacral region; and that both patients had had a cesarean section through a transverse incision in the lower segment, followed by postoperative suppuration of the operative wound and the formation of a bandlike scar in the lower part of the anterior wall of the uterus.

Defective repair of the anterior wall of the uterus is believed by the author to be responsible for the dystocia in deliveries subsequent to a former delivery by transverse cesarean section. He holds that the longitudinal nerve pathways are interrupted by the transverse incision, and, as a result, during labor the normal nerve impulses, which give rise to the intersegmental uterine contractions, are unable to pass to the lower segments of the anterior uterine wall and the anterior cervical lip. The dilatation of the cervix is interfered with and the descent of the fetus is arrested on account of failure of contraction of the lower uterine segment.

The transverse scar, per se, does not necessarily play a part in the dystocia, for while the majority of the muscle fibers of the lower segment are in a circular plane, some are oblique and some are longitudinal. When the scar is denser than normal on account of postoperative suppuration of the opera-

tive wound, it becomes the site of suprapubic pain during dystocia. Ordinarily the pain of childbirth is lumbosacral, but that of the 2 cases reported, was suprapubic. The author believes that the origin of infection of the operative wound of cesarean section is usually endouterine after faulty wound repair.

In conclusion, the author believes that the incision in cesarean section should be considered from a functional standpoint and not a purely anatomical one. Transverse incision should be reserved for those cases in which the longitudinal incision is definitely contraindicated (e. g., in the presence of midline tumors or abnormal bladder adhesions).

BLACKWELL MARKHAM, M.D.

NEWBORN

Premature Births. LEWIS A. KOCH, C. A. WEYMULLER, and ELIZABETH JAMES. *J. Am. M. Ass.*, 1948, 136: 217.

Prematurity is the leading cause of death in the newborn. In one-half of these newly born infants death occurs during the first 24 hours of life, as the result of birth trauma and asphyxia during labor and delivery. The obstetrician's contribution to the reduction of this rate is twofold, namely, attempted reduction of premature delivery, and protection of the infant during labor and delivery.

A list of helpful suggestions are presented: (1) adequate supervision of the hygiene of pregnancy; (2) proper advice concerning diet, coitus, rest, and exercise; (3) immediate notification of the obstetrician whenever any untoward symptoms occur; (4) early discovery of syphilis and vigorous treatment for it throughout pregnancy; (5) prevention of congestive failure in cardiac disease through joint supervision by cardiologist and obstetrician; (6) determination of the size of the fetus by means of roentgenography, and consultation with a competent obstetrician before interrupting pregnancy by artificial means; (7) elimination of morphine, scopolamine, barbiturates, and general anesthesia in all labors in which prematurity is involved; (8) administration of vitamin K to the mother before pregnancy is interrupted, and to all premature infants immediately after birth; (9) preservation of the membranes as long as possible, and episiotomy to protect the premature infant from the pressure effects of labor; (10) spontaneous delivery of the second twin and avoidance of version and extraction whenever possible; (11) postponement of the tying of the cord until it stops pulsating so that the child may receive as much blood from the placenta as possible; (12) reception of the newborn premature infant in a tub of warm water to prevent chilling while waiting for the cord to stop pulsating.

The authors discuss the pediatrician's role in reducing the mortality from prematurity. They outline their own technique and quote favorable clinical statistics to support their contentions. The delivery rooms are prepared for the reception of the premature infant, and a heated crib, facilities for the administration of oxygen, and a warm tub are available.

Their nursery unit, admittedly not ideal, is so planned that each unit is as small as possible, consisting of 7 term babies and 1 premature infant. The care of infants in this unit is conducted by one nurse who does not handle any other babies. The danger of contact infection from visitors to mother to baby has been reduced by requiring all visitors to wear masks and gowns, and by the use of rope barriers which prevent contact with the bed or bed clothes.

The personnel must have throat cultures, the nurses are required to wear a mask and gown, and physicians and cleaning women are required to wear a mask, gown, and sterile gloves. All equipment is sterilized before it is placed in the unit, and each unit is self-sufficient. Infected infants are removed immediately, and no new babies are placed in that unit until the remaining babies have been discharged and the room has been thoroughly decontaminated. The authors stress the maintenance of adequate records on the progress of infants, and at present house officers are more closely supervised than had previously been the custom.

From 1924 until 1940, 1,125 premature infants were born in the Long Island College Hospital, New York, New York, with a mortality rate of 28.4 per cent. Since the initiation of the previously mentioned measures from 1940 to 1945, 637 premature infants were born with a mortality rate of 16.3 per cent, an overall improvement of 30 per cent.

JAMES F. DONNELLY, M.D.

MISCELLANEOUS

The Ectodermal Elements of the "Situs Placentaris" (Gli elementi ectodermici del "Situs Placentaris"). LUIGI DE GIORGI. *Arch. ostet. gin.*, 1947, 52: 129.

In the normal process of placentation, elements defined as ectodermic in nature are found in the ambit of the decidua basalis and of the myometrial strata. It is the intention of the author to study this phenomenon and its quantitative variations during the gravid state; its genesis and disappearance; also the behavior of these elements in cases with retention of placental tissue after abortion and delivery. He is also interested in the influence which certain pathological uterine conditions (myomas of the corpus uteri, carcinomas of the cervix of the uterus, chronic metritis), certain diseases of the ovary (tumors, ovarian cysts), various maternal diseases (tuberculosis, osteomalacia, eclampsia), as well as placenta previa and ectopic pregnancy will have on such elements.

After an accurate and meticulous revision and discussion of the literature, the author proceeds to report his cases, 36 in all, representing various stages of pregnancy and the puerpuerium. There were 8 cases of ectopic pregnancy, and 20 cases representing uterine scrapings from postpartum and postabortive retention. He presents his conclusions from histological study of the situs placentaris.

In the ambit of the situs placentaris is to be noted the prevalence of elements mononuclear, polygonal,

or fusiform, with granular protoplasm and a nucleus round or oval in shape, also elements polynuclear and gigantic with a hyperchromatic nucleus and a granular homogeneous protoplasm, and elements both mononuclear and polynuclear and with a fibrillar protoplasm. These elements are distributed sparsely or in colonies and with a quantitative variation more accentuated in the fourth, fifth, eighth, and ninth months of pregnancy; they are not influenced by constitutional disorders or diseases of the uterus and adnexa, and retrogress and disappear 2 weeks after delivery or after interruption of pregnancy. These elements are totally absent in tubal pregnancy. As collateral findings there are trophoblastic elements in the lumen of the vasa of the decidua and myometrium; these are more prevalent in cases of tubal pregnancy. In postabortive and postpartum retention of ovular residue, these elements persist longer than usual in the areas of decidua and myometrium where the retained tissue is attached.

A varied genesis of these elements is suggested by their characteristics of structure, quantitative proportions, and topographic ubiquity. The mononuclear forms seem to originate from cytotrophoblastic elements, although it has been suggested that such elements can originate also from the cells of Langhans: the polynuclear and mononuclear types with a fibrillary protoplasm must originate from muscular elements, while the polynuclear forms with a clear protoplasm and nuclei defective in chromatin must originate from decidual cells. The author concludes that the cellular elements characteristic of the situs placentaris, with a muscular, decidual, and connective tissue origin must be understood to be quantitatively and functionally related to the elements of ectodermic origin. Trophoblastic emboli are among the vascular changes found constantly in the placental bed. In eclamptic patients, these are found in the vessels of the uterus as well as in other organs (lungs, liver). The characteristic cellular structure of these embolic formations gives them a trophoblastic origin.

In the ambit of the decidua basalis and myometrial strata of the situs placentaris, the elements of ectodermic origin constantly present are mostly gigantic polynuclears which differ quantitatively in each case according to the stage of pregnancy; also the elements of different origin (muscular, decidual, and connective tissue) which are present are in direct quantitative proportion to the ectodermic components. The definite absence, in the beginning of pregnancy, of germinative centers of such ectodermic elements gives them an autonomic property or character later in pregnancy which suggests a functional capacity. However, no hypothesis can be built on the functional activity of such elements. The gigantic mononuclear elements of the situs placentaris are an inherent characteristic of the process of placentation, ectodermic in origin, and they vary quantitatively according to the activity of the chorionic ectoderm. This constant quantitative variation noted in the different forms of uterochorionic pathology gives important information in the field of biopsy.

The terms "ectodermal invasion of the uterus" and "chorionic infiltration" must be reserved for special pathological entities. "Ectodermal invasion" must be reserved for those cases with a quantitative increase of ectodermal elements and a topographic anomalous presence of ectodermal elements in the myometrium. "Chorionic infiltration" suggests the penetration of chorionic cells within the venous sinuses of the myometrium as well as the lesions resulting from this endovascular anomalous invasion.

JOSEPH M. A. PAPE, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

The Possibility of Surgical Treatment of Anuria (Le possibilità della terapia chirurgica dell'anuria). G. Psacharopulo and C. Orecchia. *Boll. Mem. Soc. piemontese chir.*, 1947, 17: 247.

Surgical treatment of anuria has at times been widely practiced, but in the last few years a reduction in the number of cases has been noticed in the literature.

With the increase in the incidence of anuria since the advent of widespread transfusion and sulfonamide therapy, surgical treatment of this condition becomes a topic of renewed interest. After reviewing the results of operative treatment of anuria, the author discusses the treatment given at the Surgical Clinic of Torino.

Surgical treatment of anuria consists of the following operations: decapsulation, nephrostomy, pyelotomy, ureterotomy, renal enervation, and decortication of the renal artery. The following minor surgical procedures are also used: vesical distention, ureteral catheterization, anesthetic infiltration of the renal pedicle, anesthetic infiltration of the splanchnic nerves, spinal anesthesia, and paravertebral nerve block.

Anuria, in a certain sense, is always secretory, for it always consists in an arrest of the secretory function.

The author follows this classification of anuria: (1) prerenal, which is due to causes acting on the circulatory, humoral, or nervous mechanism independent of a primary change in the kidneys themselves; (2) renal due to inflammatory or degenerative processes which affect diffusely the renal parenchyma; (3) subrenal or postrenal, caused by obstruction of the ureters or ureter in case of the existence of only one kidney; (4) arenal, which occurs when one kidney is absent or severely damaged and the other is totally insufficient; and (5) reflex, which results when inhibitory nervous reflexes arise.

The mechanism by which the various surgical procedures act is discussed in detail.

Indications for surgical treatment of anuria are:

1. Prerenal anuria. The causes of this type of anuria which lie outside the urinary apparatus, include spasm, compression, or obliteration of the renal vessels; anuria due to hypotension, hypertension with renal ptosis, and to changes in the blood, e.g., that due to asphyxia. Medical treatment of these conditions is usually very efficient. Minor surgical procedures, e.g., anesthetic infiltration of the renal pedicle or splanchnic nerves to relieve the spasm of the renal vessels, sometimes have to be employed.

2. Renal anuria. The transitory type of renal anuria, which follows renal colic and operations, and lasts for from 12 to 24 hours without complications is treated medically. In acute diffuse glomerular nephritis medical treatment is also efficacious. In the more serious cases decapsulation has been used with benefit. Treatment of chronic nephritis is medical, and that of renal damage, resulting from poisoning by heavy metals in the majority of cases, is also medical. In these cases decapsulation is of benefit only when done early before irreparable damage has been done to the renal parenchyma.

3. Postrenal anuria due to mechanical obstruction, either intrinsic or extrinsic, is best treated by the proper surgical treatment. In cases of intrinsic obstruction, due to calculi, blood, or tumors in the urinary system, relief is obtained by the surgical procedure indicated, e.g., ureteral catheterization, nephrostomy, or pyelotomy. In cases due to extrinsic obstruction, e.g., pressure of tumors outside of the urinary system, surgical removal is the proper procedure.

4. Reflex anuria usually responds to minor surgical procedures.

Any surgical procedure which is indicated should be done early.

The routine treatment followed by the surgeons of the Surgical Clinic of Torino is given. During the first day or two of anuria, medical treatment is given. If the anuria persists for the second and third day, then minor surgical procedures are employed. If it persists for 4 days, or at most for 5 days, and the patient's general condition is satisfactory, then the proper major surgical procedure indicated in the case at hand is carried out.

In cases of acute nephropathy, decapsulation gives good results in most cases; nephrostomy in others. Surgical intervention is carried out on one side only. The temporary action of decapsulation and nephrostomy does not weaken their application because the treatment carries the patient over the acute episode and temporary relief favors permanent relief. The authors do not think surgery is of any use in cases in which the damage to the renal parenchyma is severe, which is indicated by complete anuria of several days' duration.

The authors have had no experience with the treatment of posttransfusion anuria but they give the results of French authors who have recorded many cases relieved by decapsulation and paravertebral anesthesia.

The authors have treated sulfonamide anuria successfully by medication in most cases. Rarely have they had to resort to minor surgical procedures such as infiltration of the renal pedicle.

Postrenal anuria is treated medically, only the exceptional case requiring relief by bilateral urethral catheterization or nephrostomy.

In reflex anuria, decapsulation has been done with good results in many cases. The majority of these cases can be treated successfully by medical treat-

ment or minor surgical procedures. Nephrostomy, when used, affords the advantage of exploration of the organ at the time of operation.

BLACKWELL MARKHAM, M.D.

Hematuria from Aneurysm of an Arciform Artery of the Kidney (Ematuria de aneurisma di un'arteria arciforme del rene). ANGELO MARINI. *Boll. Mem. Soc. piemontese chir.*, 1947, 17: 315.

The cause of hematuria of renal origin can in most cases be determined very easily by modern diagnostic methods. The comparatively few remaining obscure cases of hematuria, so-called essential hematuria, can be treated successfully in 50 per cent of the cases (according to some authors) by simple renal enervation or decapsulation, exploratory nephrotomy and nephrectomy being required in the remaining cases.

A case of renal hematuria of obscure origin studied at the Institute of Urology and Pathological Anatomy at the University of Milan is presented and discussed.

A 61 year old male entered the hospital for the relief of renal colic. Eight days before he had wrenched his right flank while riding a bicycle. Later he developed pain in his right flank and passed bloody urine which contained clots over a period of 12 hours. Four days later the same events recurred. On entry, physical examination was negative except for gross hematuria. Cystoscopy showed the right ureteral papilla to be plugged by a blood clot. On removal of a 2 cm. clot from the right ureter, catheterization was performed and bloody urine was obtained from the right renal pelvis. Pyeloureterography was negative. Intravenous injections of vitamin C were given in an effort to arrest the hematuria, but they were ineffective. An exploratory operation was then resorted to and decapsulation of the right kidney was done. Postoperatively the hematuria returned and persisted. Twenty-eight days after the first operation, a second operation was performed, at which time a nephrectomy was done. Histological examination of the kidney removed revealed that the hematuria was due to the presence of a small aneurysm of an arciform artery of the right kidney.

This case is reported as an example of the impossibility of making an accurate preoperative diagnosis in cases of essential hematuria. After the ordinary diagnostic procedures had failed to reveal the cause, even a nephrotomy failed to give additional information. Arteriography is perhaps the only method which would have thrown any light on the diagnosis and this is doubtful.

The author concludes that in cases of essential hematuria, which are unaffected by all possible methods of medical treatment, surgical treatment should be employed promptly. Renal decapsulation should first be tried. Nephrotomy with removal of tissue for biopsy should be done in cases in which the exposed kidney suggests pathology of the renal parenchyma. When the hematuria persists in spite of these measures, radical nephrectomy should be done to eliminate the danger of a neoplasm which cannot be diagnosed macroscopically.

BLACKWELL MARKHAM, M.D.

Chronic Pyelonephritis. J. H. CARVER. *Brit. J. Urol.*, 1947, 19: 223.

Chronic pyelonephritis is a serious disease, leading to the progressive destruction of the renal parenchyma. It is accompanied by hypertension in about 30 per cent of the cases. The disease may be unilateral or bilateral; the pelvis of the kidney is widened, the calices are clubbed, and the kidney may be reduced to half its normal size because of contraction. These changes are best seen in the retrograde pyelogram. The author reports 6 cases. He has usually found the organism to be the Bacillus coli, the Staphylococcus, or the Streptococcus. The symptoms are rather insidious and varied. There may be recurring attacks of pain in the loin, with frequency and burning. Repeated chills and fever are not uncommon. Most patients complain of lassitude, inertia, and the constant feeling of being below par.

The diagnosis may be difficult. Urinalysis usually shows low concentration, albumin, a few red blood cells, pus cells, and organisms on culture. Pyelography in the early stages of the disease may fail to show more than widening of one or two calices. Intravenous urography will likely demonstrate poor function. The blood urea is often elevated.

The author suggests that the term pyelitis be discarded as it does not reveal the true seriousness of the disease.

JOSEPH E. MAURER, M.D.

Contribution to the Study of Primitive Papillary Tumors of the Renal Pelvis (Contributo allo studio dei tumori primitivi papillari del bacinetto renale). FEDERICO TUPONE. *Arch. ital. urol.*, 1947, 22: 20.

A 39 year old fisherman upon returning from heavy labor noted that his urine was of a reddish-brown color and experienced vague pains in the region of the left flank, with "pollakiuria" and steady pain in the region of the bladder, more intense at the end of micturition. At this time a physician diagnosed congestion of the neck of the bladder. During the following 3 months the pains occurred twice. Sixty days after the first attack the bleeding reappeared and was again associated with the symptoms described. This attack finally ended as urinary retention which was relieved by catheterization. Another attack of acute urinary retention led to hospitalization and the patient suffered another attack of hematuria while he was absolutely bedfast and without the slightest provocation.

Laboratory methods, particularly ascending pyelography, suggested calculus; however, the absence of renal colic, febrile attacks, or pyuria, and the unprovoked hematuria favored the diagnosis of neoplasm. The kidney, together with the ureter, was removed. In the somewhat enlarged kidney pelvis was found a large cauliflower growth attached to the pelvic wall where it was reflected on a renal papilla. In addition there were a number of small papilloma-

tous excrescences scattered about at other points on the pelvic wall.

Histologic examination of these growths disclosed the characteristic stromal arborizations covered by the multiple layers of predominantly cylindrical epithelial cells resembling the normal mucosal lining of the renal pelvis. However, as the basal zones of the tumor were approached the histologic picture indicated a lack of sharp delineation between the epithelial and the underlying stroma, the pegs of epithelial proliferation in places penetrating for some distance into the underlying connective tissue which forms the supporting structure.

The author emphasizes in this report the superiority of clinical control over laboratory methods of diagnosis. He also insists on the necessity of ureteronephrectomy in these patients, since in many there are secondary or accessory growths within the kidney substance and in the ureter.

JOHN W. BRENNAN, M.D.

Ureteroduodenal Anastomosis. JOSEPH G. FORTNER and JOSEPH H. KIEFER. *J. Urol.*, Balt., 1948, 59: 31.

Because the usual rectosigmoidal site for anastomosis of the ureters into the bowel is not entirely satisfactory, the authors undertook an experimental study to clarify and re-examine the possibilities of ureteral implantation into the various portions of the small bowel.

The experiment was divided into 3 parts. In part 1 the ureters were transplanted into the rectosigmoid for the purpose of perfecting a technique and establishing controls which could be compared with the results of further investigation. In part 2 both ureters were transplanted into the duodenum at one operative procedure. In part 3 one ureter was transplanted into the duodenum at 1 operation, followed by transplantation of the second ureter at a later date.

The dog was used as the experimental animal. The preoperative care consisted of nothing by mouth, with the exception of water, for 36 hours prior to operation. At no time were the sulfonamides, penicillin, streptomycin, or similar drugs used. A general diet was given to all dogs both preoperatively and postoperatively. Blood samples were drawn before the operation and every day or every other day thereafter, according to the condition of the dog. Nonprotein nitrogen and urea nitrogen determinations were made on these blood samples. Liver and kidney biopsies were taken at the time of operation. Upon death of the animal an autopsy was done and tissues taken for microscopic study. The anesthetic agents used were morphine sulfate and nembutal given intraperitoneally.

A modified Coffey 1 operation was used. With an anterior abdominal approach the ureter was mobilized from the urinary bladder to the kidney pelvis by opening the posterior parietal peritoneum. A longitudinal incision from 3 to 4 cm. long was made through the serosa and muscularis of the selected portion of the bowel. The distal end of the ureter was then implanted through an opening made through the bowel mucosa at the distal end of this incision. The distal end of the ureter was transfixed by a suture through the wall of the bowel. The bowel wall was then sutured in two layers over the intramural ureter, which completed a submucosal tunnel. The anterior abdominal incision was closed. Care was taken to keep the ureter straight and untwisted; also to prevent compression in the submucosal tunnel. The blood supply to the ureter was carefully preserved.

Part 1. A control group of 7 dogs in which rectosigmoidal transplants were done. After completion of the study it was concluded that an anastomosis which would permit the operated animal to live a prolonged period of time had been made in all but 2 cases. Although some of the other animals showed evidence of hydronephrosis, pyonephrosis, or pyelonephritis, these continued clinically normal, and chemically demonstrated from slight to moderate elevation of their nonprotein nitrogen and urea nitrogen levels. Other anastomoses were entirely satisfactory.

Part 2. The second group (with bilateral implantation into the duodenum at 1 stage) included 14 dogs. Six of these animals died on the second and third postoperative days of factors which were not relevant to the experiment. The remaining 8 animals followed a singular similar course, clinically, chemically, and pathologically. These animals lived from 5 to 12 days following the operative procedure. Clinically they differed only by being progressively less active than in their preoperative state. They did not eat or drink well postoperatively and demonstrated marked cachexia 2 or 3 days before death. Chemically, there was an astounding rise in the nonprotein nitrogen and urea nitrogen on the first postoperative day. Following this there was a rapid rise in both values in an almost parallel fashion.

From this group it was concluded that bilateral transplantation of the ureter into the duodenum is surgically possible, but the animal's longevity is limited by factors to be discussed later.

Part 3. In this group (unilateral transplant into the duodenum at 1 stage followed by transplantation of the opposite ureter into the duodenum about 2 months later), 4 animals were used, 2 of which lived 7 days. The remaining 2 were in such poor condition on the fifth postoperative day that they were sacrificed. The nonprotein nitrogen and urea nitrogen in the 2 surviving animals rose slightly, yet remained within normal limits during the first few days. Following the second stage procedure, there was little or no difference from the animals in group 2 and the authors concluded that transplantation of the ureters into the duodenum in 2 stages does not give the animals a tolerance to a high nonprotein nitrogen and its consequent deleterious effects. The hydronephrosis encountered is evidence that the kidney continues to function more or less well in its new relationship.

The course of the animals with bilateral ureteroduodenostomy is such that two entirely different

mechanisms may have to be considered to explain the azotemia: (1) cessation of renal functions and (2) intestinal reabsorption of the secreted kidney products.

On the basis of previously published literature it was thought that the theory of intestinal reabsorption of the secreted kidney products explained the findings. The authors conclude that the kidney of the transplanted ureter continues to function in an efficient yet hyperactive manner. The small bowel physiology is such as to result in an almost total reabsorption of the secreted kidney products, which gives rise to a rapid increase in the nonprotein nitrogen, urea nitrogen, and their associated products. These in turn act as physiological stimulants to produce a futile increase in renal secretion. A vicious cycle is thus established which culminates in the death of the animal after the nonprotein nitrogen and its associated products reach a level incompatible with life. Therefore, ureteroduodenostomy is not compatible with longevity of the operated animal and has no clinical use. ROBERT O. BEADLES, M.D.

BLADDER, URETHRA, AND PENIS

The Amino Tumors of the Bladder, So-Called Aniline Tumors. Seventeen Cases Occurring in France (Les amino-tumeurs de la vessie, tumeurs dites aniliniques. Dix-sept observations françaises). J. L. BILLIARD-DUCHESNE. *J. urol. méd.*, Par., 1946–47, 53: 401.

The 17 patients included in this material were all employed in industrial enterprises engaged in the manufacture of dyes. Specifically the carcinogenic substances incriminated are benzidine, alpha-naphtylamine, beta-naphtylamine, ortho-amino-azotoluene, and 2-acetyl-amino-fluorene; however, only the first 3 cited have been proved by experimental means to provoke cancer. In no instance did the location of the tumors, their symptomatology, or their histologic character permit of their being differentiated from the usual tumors of the urinary bladder. In 5 cases there was only one tumor. In 3 of these cases it was malignant; in 1, benign, and in the last case no histological examination was made. Of the multiple tumors, all were malignant except in 1 case; that is, 15 of the 17 patients (88 per cent) were proved, histologically or clinically, to be suffering from malignant tumors. This represents a high percentage of malignancy, and undoubtedly if the employes had been subjected to routine cystoscopic examination earlier the percentage of malignancy would not have been so high. However, the author does not mean to imply that these tumors were originally of a purely benign character.

Therefore, since there seems to be no reliable means of differentiating the industrially provoked from the spontaneous tumors of the bladder, the author resorts to statistical proofs of their industrial character. The establishments in which these patients were employed and in which they were brought into contact with the carcinogenic substances were designated H establishments. It was found that the industrial concerns employed somewhere between 1,193 and 1,009 workers who might have been sufficiently exposed to the amine derivatives; this would mean that about 100 individuals of each 100,000 employes were affected, or 43 times the rate of involvement per 100,000 of the general population of France. In the author's opinion this rate of incidence proves that the tumors observed in this material were related to the amino factor.

The treatment in these cases does not differ in principle from bladder tumors in general. It is in the matter of prophylaxis that they offer special interest. In the author's opinion, workers should not be allowed to work longer than 5 years in a factory where they would be exposed to the fumes or the dust of these carcinogenic substances and this prohibition should include engineers, laboratory workers, repairmen, lift operators, and others. Before the worker is employed his past should be reviewed to make sure that he has not previously worked in such a factory. Compulsory submission to cystoscopic examination should be introduced in France. Where possible, closed systems of manufacture should be developed and adequate ventilation systems and spacious working quarters should be provided. The employes should be instructed in personal hygiene: frequent washing of the hands and face and daily showers, and the wearing of impermeable clothing should be encouraged. Rubber gloves should be used for handling the various pumps and other apparatus for transferring the materials. A periodic examination of the residual urine should be instituted with careful microscopic search for red blood cells and when these are found special cystoscopic and hygienic measures should be put in force.

The author intends to make a subsequent report on the cystoscopic technique, which he believes is the key to the early diagnosis of bladder involvement.

JOHN W. BRENNAN, M.D.

The Treatment of Rupture after Previous Healing of the Membranous Urethra. The Value of Preoperative Ascending and Retrograde Urethrography, and of the Employment of an Inlying Rubber Tube in the Reconstruction of the Urethra (Du traitement des ruptures anciennes de l'urètre membraneux. De la valeur de l'urétrographie ascendante et rétrograde préopératoire, et de l'emploi d'un tuteur pour la réfection de l'urètre). L. SABADINI. *J. chir.*, Par., 1947, 63: 601.

In the author's urologic service at the University of Algiers he has had 70 cases of rupture of the urethra. These have included civil accidents and military injuries in the African army in combat service in Tunis, Italy, Corsica, and in the South of France, during the period from 1943 to 1946. Thirty-two of these were ruptures of the membranous urethra, after previous healing, and it is with the treatment of these cases that this report is concerned.

All of the patients had received an emergency cystostomy and were turned over to the author's

service often 2 or 3 months after the cystostomy operation. In these cases the lumen of the urethra was not only obtruded but the proximal and distal urethral cul-de-sacs were often separated by several centimeters of dense cicatricial tissue, often extending for considerable distances in various directions. In some instances previous reconstructive operations had been attempted, and in others fistulous tracts, purulent pockets, and abscesses had to be given preliminary operative attention.

In many of these cases the roentgen films and even the case histories were lost so that in much the author has had to depend upon his memory; however, at least some detail is given in 26 cases. These included 9 cases observed before he developed his method of simultaneous ascending and retrograde urethrography, and 17 observed after the method was developed. In the latter group there were 9 cases with extensive cicatricial destruction of the urethral lumen, 1 case with a moderate amount of destruction, and 1 with a very small connective tissue block. Three cases were complicated by the presence of abscesses, and in 2 cases the two ends of the urethra were displaced with reference to one another.

The operative procedure described is that used for the extensive injury, with as much as 3 cm. of sclerotic tissue which blocks off the two ends of the urethra. When the patient is ready for operation, that is, when any infectious processes are cleared up as well as possible, the connective tissue is approached through the usual midline perineal incision, the anobulbar ligament and the rectourethral muscle being cut to open up the prostatorectal space. An incision is made into the urethral lumen, including that of the bulb and distal cul-de-sac, and a catheter is retained in the closed distal sac of the urethra by an assistant acting as a guide. The retrograde catheter, also held firmly in the proximal sac, is palpated and the incision is carried backward, being kept well forward, away from the rectum, so as to open up this part of the urethra also. The 2 ends of the urethra are then freshened and all the sclerotic connective tissue is cut away as thoroughly as possible, even laterally as far as possible, into healthy tissues. The in-lying rubber tube is then introduced in retrograde direction through the bladder and proximal urethral opening, into the operative wound and thence through the distal portion of the urethra so as to protrude through both the cystostomy opening into the abdomen and through the external urethral meatus. Apparently no attempt is made to unite the two ends of the urethra and the membranous urethra is closed by any tissue which may be available around the rubber tube. In case of necessity even the anterior wall of the rectum may be used to fill out the defect. The incision in the bulbous portion of the urethra is then closed with great precision, by means of small catgut sutures in several layers.

The postoperative care of the patient is at least as important as the operation itself. The in-lying rubber tube is retained in place for 25 days or longer, and it is kept covered with an antiseptic paste. If signs of infection appear, the tube (even though it become exposed in places) is not disturbed, nor is any attempt made to cover it over with additional sutures as reconstruction of the urethral lumen is left to the natural proliferative processes of the tissues. If one or two sutures should show a little pus those sutures are removed but the others remain undisturbed. Constipation is induced for 7 or 8 days following the operation. However, the dressings are changed daily, even before the bowel is permitted to move. The in-lying tube is flushed out daily and kept sterile. In a few of the latest cases penicillin had become available and seemed to be of striking benefit.

All of the patients in this material were cured by this method. A few complained of some incontinence of urine and 2 experienced periods of acute urinary retention; however, this difficulty could always be relieved by passing a sound and the condition was much relieved by diathermy treatments, with a metal sound as electrode. The author believes that the retention resulted from urethral spasm.

JOHN W. BRENNAN, M.D.

GENITAL ORGANS

A Study on the Subject of Occult Cancer of the Prostate (Investigación sobre el cáncer oculto de la prostata). JORGE E. LUPPI. *Rev. méd. Rosario*, 1947, 37: 845.

In the year from November, 1943 to November, 1944 the author procured 141 prostate glands from autopsies on males without discrimination as to age. This study was carried out at the Institute of Anatomy and Pathologic Physiology in Rosario.

These specimens were so prepared and sectioned as never to leave more than 4 mm. of thickness without microscopic study. The stain used was hemotoxylin-eosine. In this series cancer was found histologically in only 3 glands, (2.1 per cent). However, all of these cancers occurred in patients over 40 years of age, of whom there were 111. Two of these cancers of the prostate were by no means occult, but could have been diagnosed clinically; in fact, one of the patients died of metastases to the liver. Considering therefore that 1 case of occult cancer was found among 111 patients over 40 years of age, the corrected figure of incidence would be 1.1 per cent, and for the entire number of 141 prostates from patients of all ages and fairly representative of the general population the incidence would be 0.7 per cent.

These figures are a far cry from the disquieting reports of high percentages of occult cancer of the prostate from other sources, and the author, in an attempt to elucidate in every way possible the discrepancies thus introduced into the literature, gives three possible sources of varying interpretations. The first is the case of the prostate which has already begun to develop the typical adenoma which in turn compresses the neighboring tissues, collapses and distorts the glandular tubules, and at times converts them into a mere trabecular strip of cells of irregular

size and shape. Another source of conflicting interpretation of the histologic picture might occur in the cases of senile prostates in which the normal processes may alter not only the form and disposition of the cellular elements but also the staining characteristics, and present on occasion a histologic picture very difficult to differentiate from that of incipient neoplasm. The final cause of confusion which the author has encountered may lie in the existence in the same prostatic matrix of 2 different types of glandular tubules. One type of tubules has cells of basophilic plasma and a compressed appearance, with a tiny glandular lumen or no lumen at all, the cells themselves exhibiting meager amounts of plasma and a large deeply staining nucleus. The tubules are irregularly disposed and in general give the impression of a pseudoneoplastic process. The other type is composed of tubules whose cell-protoplasm may, in contradistinction to the first type, be designated acidophilic. These tubules form glandular mosaics lying closely side by side, almost without interstitial connective tissue. The lumina of these tubules are larger than those in the first type and contain rather small, varying amounts of secretion. The cells composing these glandular structures are large, clear, and rather regularly arranged, with abundant protoplasm and lightly staining basally situated nuclei. These areas are interpreted by the author as possible beginnings of adenomatous prostatic hypertrophy with different types of histologic pictures because of the differing degrees of maturation of the component cells. All these findings he designates as pseudoneoplastic histologic manifestations. JOHN W. BRENNAN, M.D.

The Medicosurgical Treatment of Cancer of the Prostate. Subcapsular Orchectomy and Hormone Therapy (Sur le traitement médico-chirurgical du cancer de la prostate. Orchidectomie sous-capsulaire et hormonothérapie). AUGUSTE CASSUTO. *J. urol. méd.*, Par., 1946–47, 53: 423.

This eminent urologist from Rome, Italy, begins his address by expressing his appreciation of the courtesy shown him by the allied army of occupation, and especially by Lieutenant-Colonel Bizzozzero, chief of the sanitary service of the Army of the United States in Rome, in providing him with medical literature and with such quantities of diethylstilbestrol, gratis, as he has needed for his work.

Since the opinions of writers do not agree as to the preferred treatment of cancer of the prostate, the author feels no hesitancy in stating his own opinion although he has not been using his methods for a 5 year period as yet. He prefers immediate castration by subcapsular curettement of the glandular tissues of the testicle as proposed by Riba in 1942. Medical treatment with diethylstilbestrol is then initiated and continued for long periods of time. The usual dose of this preparation is 5 mgm. per day orally; however, the dosage is increased or diminished as indicated for the individual case. Some patients have tolerated as much as 1,000 mgm. of diethylstilbestrol daily. When the castration has preceded the medical treatment no effects are noted on the breasts or general condition. If the patient proves to be intolerant to the diethylstilbestrol the dosage may be lowered or another preparation, such as dienestrol, may be substituted.

Of course, if the patient refuses the operation, medical treatment is all that remains; however, in these cases the effects are pretty much the same, although not so soon attained and not so pronounced. The most striking effects, aside from the prolongation of life, is the relief from incontinence and retention, and from pain. The tumor becomes softer and loses its rough nodular feel and even seems to decrease in size; however, the author has never seen the tumor disappear entirely. The pains ascribable to the metastases appear also to be relieved.

This is the first report of a chemical preparation which exerts an effect on cancer and this fact alone should spur research in this field.

JOHN W. BRENNAN, M.D.

Aseptic Prostatectomy. FRANCIS E. STOCK. *Brit. J. Urol.*, 1947, 19: 206.

The method of prostatectomy originated by Wilson Hey is discussed, and 24 cases in which this technique was used are reported. The author stresses that the diagnosis must be a clinical one, and that the patients must not be subjected to cystoscopy or catheterization before operation. If the patient is seen in a state of acute retention, the operation is performed as an emergency. The technique is described in detail:

After the bladder has been opened and emptied suprapubically, a catheter is passed in retrograde fashion. The ureters are identified and a mark made with the diathermy knife ¼ inch in front of each. From these marks a diathermy incision through the mucosa is made around the periphery of the upper surface of the prostate. Enucleation of the adenoma is then done, bleeding points being grasped and fulgurated as they are encountered. A V-shaped piece of the trigone is then removed, the apex of the V being posterior. A urethral catheter is then placed by "railroading" it through in a retrograde manner, and fixed in the bladder by a Harris stitch. The bladder is closed in two layers, and tested for watertight integrity. A drain is left in the space of Retzius.

The catheter was removed on the third or fourth postoperative day, and the drain from the space of Retzius on the second. Early ambulation was routine, as was chemotherapy.

The author's conclusions were favorable. There was no mortality. JOSEPH E. MAURER, M.D.

Retropubic Extravesical Prostatectomy of Millin (Die retropubische extravesikale Prostatektomie nach Millin). W. BRUNNER., *Helvet. chir. acta*, 1947, 14: 320.

The author reports on 50 cases of prostatectomy by Millin's method. His series of cases is classified

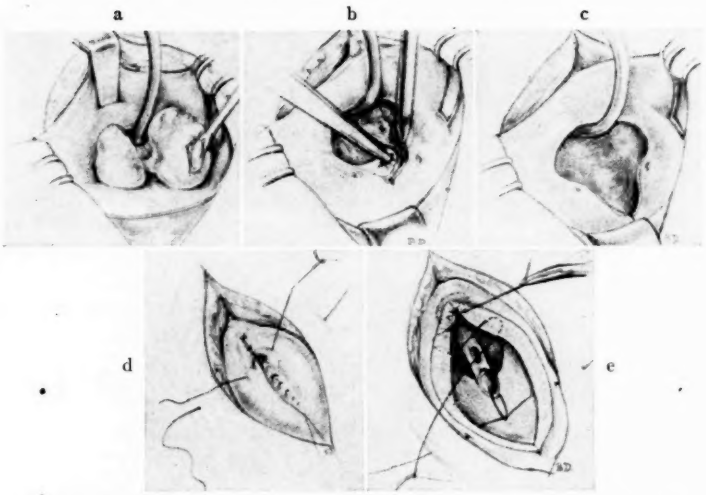

Fig. 1 (Stock). a, Lateral lobes delivered into bladder. The floor of the urethra is divided with a diathermy cut at about the point where it dips out of sight. b, Excision of trigone with diathermy. c, Appearance of prostatic cavity after trigonectomy and incision of interureteric bar. d, Fixation of urethral tube and insertion of continuous catgut suture avoiding mucous membrane. e, Interrupted nylon sutures in one or two layers.

as follows: adenomatous prostatic hypertrophy (soft form), 28; fibrous solid form of prostatic hypertrophy, 9; prostatic hypertrophy with chronic interstitial inflammation, 7; sphincter sclerosing or prostatic atrophy, 3; and carcinomatous degeneration in prostatic hypertrophy, 4. Millin's operation is described and the postoperative care is outlined. The postoperative course is particularly favorable, morphine seldom being required. Operative shock is slight and approximates that of perineal prostatectomy. The prevesical drain is removed about the third or fourth day and the catheter the sixth day.

Total urinary incontinence did not occur, while relative incontinence with coughing and straining occurred once in a few weeks and twice in a few months. Urinary retention immediately or soon after operation occurred in 6 patients, of whom 3 were among the first patients operated upon. As a rule, in 1 to 3 days the urine was no longer bloody and postoperative bleeding in general was slight. Late bleeding occurred in 4 cases but was never serious. A slight wound infection without urinary fistula occurred in 2 cases and healed spontaneously. A transient urinary fistula was observed in 3 patients. Persistent urinary fistula was observed twice and was the most serious wound complication noted. Other complications were pyelitis, 2 cases; pulmonary infarct, 1 case; and bronchopneumonia, 1 case.

There were only 2 deaths in the series in which the prostatectomy could be considered contributory, one occurring 5 weeks postoperatively from acute hemorrhage from a duodenal ulcer, and the other after 7 weeks from liver insufficiency.

Sexual potency is not impaired as frequently following Millin's operation as after perineal prostatectomy. Millin's operation has 2 disadvantages: namely, the danger of urinary fistula and of infection of the space of Retzius. These can be minimized by avoiding injury to the capsule with the diathermy needle. JOHN L. LINDQUIST, M.D.

Oxidized Cellulose in Suprapubic Prostatectomy. GEORGE D. STUMP and ROBERT C. THUMANN, JR. *J. Urol.*, Balt., 1948, 59: 202.

Primary closure of the suprapubic wound following prostatectomy is not new, but it has never become a widespread or common procedure because of the frequent occurrence of postoperative hemorrhage.

By using the Foley bag catheter and oxidized cellulose, the authors wish to present a method of primary closure which is relatively simple and gives minimal postoperative bleeding. Hospital days are reduced as compared with other forms of suprapubic approaches, there is no urine spilling over the abdomen, and the postoperative course by comparison is much more comfortable. The procedure follows:

1. The bladder incision is kept high in the dome with little prevesical and perivesical dissection.

2. After the prostate is enucleated, immediate hemorrhage is controlled by a hot pack held in the fossa for 5 minutes.

3. A 30 c.c. Foley bag is adequate for most cases.

4. Oxidized cellulose is placed smoothly around the Foley bulb.

5. The bag and gauze should be large enough to fold the vesical neck into the prostatic fossa.

6. There may be some bleeding along the course of the urethra, but this does not interfere with the function of the catheter and is not cause for alarm.

7. The bladder is closed completely in 2 layers.

8. Oxidized gauze begins to wash out on the operating room table, and is usually all out within 72 hours.

9. The catheter is removed by the sixth or seventh postoperative day and the patient allowed to void.

10. If the catheter does not drain well, it may be replaced at any time.

A total of 15 primary closures with oxidized cellulose have been performed at Harper Hospital, Detroit. Eleven cases of uncomplicated benign hyperplasia of the prostate are presented. The other 4 cases presented complicating features which will be mentioned later.

In all of the 15 cases immediate postoperative bleeding was at a minimum. In 1 of the 11 cases, the suprapubic wound reopened and urine drained out upon removal of the catheter. This was attributed to a low incision in the bladder at the operation which tore into the vesical neck during the enucleation and made closure of the bladder difficult and inadequate for primary closure.

In 1 other case, in which removal of the catheter was anticipated on the ninth postoperative day, the patient bled from the prostatic bed the night previously which necessitated delay in removal of the catheter.

In all but 2 cases, the urethral catheter was removed between the sixth and eighth days. The patients voided freely and maintained a solid suprapubic wound.

In 1 patient cystoscopy was done on the tenth postoperative day. No oxidized cellulose was present and epithelization had begun.

In 1 of the 4 cases not included in the series the pathological report was adenocarcinoma, although the preoperative diagnosis was benign hyperplasia of the prostate. In view of this, an indwelling catheter was left in 13 days as delayed healing was anticipated. The patient went home voiding freely with a solid suprapubic wound on the fifteenth postoperative day.

Another patient with a complicating urethrocutaneous fistula at the penoscrotal junction maintained an indwelling catheter for 10 days and went home voiding freely with a solid fistulous tract and suprapubic wound on the fourteenth day. The pathological report was leiomyofibroma of the prostate.

The third case is mentioned to show the complications which follow the placing of the Foley bulb in the prostatic fossa itself. The postoperative course was beset with severe bladder spasm, and incontinence became a discouraging feature after removal of the catheter on the eighth day. Damage to the external sphincter had occurred from the inflated and tightly drawn Foley bulb. However, the suprapubic wound remained closed in spite of the complications. Care must be taken in the proper placement of the Foley bulb.

The last case was that of a 74 year old man, which was complicated by severe sclerotic damage to the myocardium and auricular fibrillation. By the time of surgery the cardiac condition had been controlled with digitalis. Postoperatively the patient had clouding of consciousness for 12 days. The catheter was removed on the eighth day, but because of the mental state, involuntary micturition, and purulent urine it was re-inserted until the sixteenth day, after which the patient voided freely and maintained a solid suprapubic wound. Because of the cardiac and general status the convalescence was prolonged, the patient leaving the hospital on the thirty-fourth postoperative day. JOHN A. LOEF, M.D.

Spontaneous Gangrene of the Scrotum. L. T. BARCLAY. *Plast. Reconstr. Surg.*, 1948, 3: 56.

Spontaneous gangrene of the scrotum, first reported by Fournier in 1884, presents the following salient features:

1. Sudden onset in an otherwise healthy male.
2. Rapid progression of the gangrene.
3. Total absence of the normal causes of gangrene.

Beside these three clinical features the majority of cases present other common factors, as follows:

1. Extensive and relatively constant areas of gangrene. The testes, spermatic cord, and inguinal regions are rarely affected. Involvement of the penis, especially in the region of the scrotopenile fold, is not common.

2. A tendency for spontaneous repair to occur. Manson believes that in most cases there are three triangular flaps of skin left at the margins of, and projecting into, the area of slough. Two of the flaps are based laterally, one based posteriorly. Between these flaps lie both testicles. These flaps serve as centers from which epithelization begins. The repair appears rather to be due to contraction of new scar tissue, which draws the remaining scrotum over the testes, than to the epithelium growing over the granulations from the periphery.

The etiology remains obscure, but two theories have been advanced to explain the onset of this condition. A fulminating erysipelas is the cause favored by the French authors, but this theory does not explain either those cases in which the infection is not due to the hemolytic streptococcus or those cases that arise spontaneously in otherwise normal males. A second theory suggests that the disease is a gas gangrene due to either the Bacillus welchii or other anaerobes.

Manson offers an alternative explanation; he believes that the condition is a vascular disaster of infective origin, analagous to cavernous sinus thrombosis. The infection does not have any specificity other than the presence of a pathogenic organism which causes rapid thrombosis in the area supplied by these vessels. The blood supply to this region accounts for the constant area of slough, and also for

the presence of the three flaps. This area is supplied by the external branch of the femoral artery and the superficial perineal arteries. The limitation of slough on the under surface of the penis is due to the fact that the dorsal vessels remain intact, having no connection with the veins of the mediastinum below the urogenital diaphragm. The high mortality and the profound illness of these patients suggests more than localized gangrene of the scrotum due to vascular occlusion. It would seem that a combination of factors are responsible for the onset of this condition.

The treatment of choice is the radical removal of the necrotic area, for this procedure provides free drainage and helps to speed recovery. Surgical repair by skin graft is considered unnecessary.

The author reported a case in which a patient 44 years of age had been entirely well prior to the spontaneous onset of his illness. He was hospitalized in an acutely ill condition. The admission diagnosis was spontaneous gangrene of the scrotum with associated deep thrombophlebitis of the left leg and infarction of the lower lobe of the right lung. The treatment consisted of tulle gras dressings to the scrotum. Eusol in gauze dressings were renewed twice a day. Chemotherapy consisted of penicillin (14,000 units every 3 hours) and adequate doses of sulfadiazine by mouth. Dicumarol (200 mgm.) was given on admission and 100 mgm. were given daily under control by daily prothrombin estimations. A full diet and 3,000 c.c. of fluid were given each day. Healing was rapid under this regime, and on the twenty-eighth day the patient was discharged in good condition. CONRAD A. KUEHN, M.D.

MISCELLANEOUS

Reiter's Syndrome. ALBERT A. CREECY and FRANK S. BEAZLIE, JR. *J. Urol.*, Balt., 1948, 59: 234.

In 1916 Hand Reiter, while perhaps not the first to see, was first to describe a clinical syndrome characterized by urethritis, conjunctivitis, and arthritis which was nongonorrheal in nature.

Since Reiter's original description, 152 cases have been reported in the literature to our knowledge.

All the cases reported in the literature have occurred in young males (the youngest 16, the oldest 42), with the exception of 1 case reported by Lever and Crawford which occurred in a female but about which there was doubt as to its proper classification. Recurrences are seen in about 25 per cent of all cases at intervals of months to years. Multiple recurrences are not uncommon.

The disease process is acute in onset with its manifestations appearing promptly and tending to increase in severity in the first 4 weeks. It is usually ushered in with urethritis or arthritis followed by conjunctivitis, but the manifestations often supersede or superimpose one another and have no constant relationship. In some cases, transient diarrhea, cutaneous lesions, or ocular symptoms have ushered in the disease. In over 95 per cent of the cases, no venereal history or history of sexual exposure within a significant interval has been obtained. The urethritis and conjunctivitis have been purulent and tend to clear up in a relatively short period of time. The arthritis, which is the most persistent and disabling manifestation, is usually polyarticular, but cases of monoarticular involvement have been reported. In addition to the cardinal triad and complications described by Reiter, many other features have been described, including iritis, keratitis with peripheral ulceration, balanitis circinata, prostatitis, prostatic abscesses, vesiculitis, hemorrhagic cystitis, dilation of the ureters and renal pelves, pyelonephritis, joint effusions, and purpuric and vesicular cutaneous lesions.

The clinical course of the disease is protracted but self limited, attacks varying in severity and lasting from 1 to 5 months with gradual complete recovery, leaving few or no residual symptoms. No form of specific therapy including arsenicals, urotropin, local antiseptics, sulfonamides, penicillin, or gold salts has appreciably affected the course of the attacks. Beigibock used "arthigon," a vaccine producing a foreign protein reaction, in many of his 10 cases with good results. Others have reported favorable responses to fever therapy.

At the present time, complete bed rest with symptomatic and supportive therapy is our best treatment.

The laboratory data are not diagnostic. There is usually a moderate leucocytosis of from 10,000 to 20,000; the sedimentation rate is rapid during the active phase, returning to normal with recovery; a moderate anemia is usually present; the urine contains pus; the prostatic secretion often contains pus; and the synovial fluid is purulent, but sterile.

The most consistent x-ray findings have been ill-defined osteoporosis with occasional evidence of periosteal proliferation and narrowing of the joint space, but this has not been constant.

Various etiologic agents have been suggested as the cause of the disease, including a spirochete, a staphylococcus, an enterotoxin, a filtrable virus, and L-pleuropneumonialike organisms. However, smears and cultures of material from the urethra, conjunctiva, prostate, joints, and cutaneous lesions have failed to demonstrate the gonococcus or other specific etiologic agent. Also, blood and urine cultures, scrapings of the urethra and conjunctiva for inclusion bodies, darkfield studies of penile and mucocutaneous lesions, serologic tests, gonococcal complement fixation tests, agglutinations, animal inoculation, stool examinations and cultures, cold agglutination and fragility tests, and Frei, Ducrey, tuberculin, and allergic skin tests have failed to substantiate or demonstrate a specific type of etiologic agent.

To our knowledge there has been no mention in the literature as to the possible role of foci of infection in Reiter's syndrome. We believe that the presentation of our 2 cases is of value from this standpoint in view of the events following the removal of a focus of infection in each case.

A 37 year old Jewish merchant was first seen with a history of urinary frequency, burning on voiding, and a urethral discharge of 1 week's duration. He also complained of pain in the left shoulder which had been present for the same length of time, but had noted no swelling or limitation of motion. No other physical findings were abnormal except for a purulent urethral discharge and a soft, slightly tender, and enlarged prostate. A smear of the urethral discharge showed numerous pus cells. The patient returned again 10 days later by which time mild bilateral conjunctivitis had developed in addition to his other symptoms which had not improved in the interval.

Laboratory examination revealed a trace of albumin and a few leucocytes in the urine. Other laboratory examinations were essentially negative.

While his symptoms were distressing, the disease process itself was relatively mild. During his hospital stay, the temperature did not go above 99.6°F. Codeine and aspirin sufficed to control the pain. He was given a total of 420,000 units of penicillin and was discharged in a much improved condition with only a slight urethral discharge after a 4 day hospital stay.

Two days after discharge, pain developed in the left knee and the pain recurred in his left shoulder. These pains were especially severe at night and kept him from sleeping. His urethral discharge also persisted although not so profuse as previously. Four days later, he had a tooth extracted because of an apical abscess. The following day, the left knee became more painful and swollen and he was unable to bear weight upon it and at the same time he developed a moderately severe conjunctivitis. His symptoms became more severe in the following 2 days and he had a chill on October 5, 1945 following which he was readmitted to the hospital.

He was again placed on penicillin (20,000 units q.3 hrs. for 32 doses), given codeine and aspirin for pain, and moist heat was applied to the knee. The conjunctivitis subsided without therapy, and gradually the swelling of the knee disappeared without aspiration.

He has remained asymptomatic up until the present (15 months later).

An 18 year old single white male, blacksmith from a rural community, entered the hospital with a history of having been well until 2 weeks before entry when he suddenly began passing blood in his urine and began experiencing chilly sensations and fever. He had urinary frequency every hour and burning on voiding. Shortly after the onset of the urinary symptoms pain developed in the right ankle joint. One week after the onset, he noted that he was passing pus from his urethra. The right ankle was now swollen and more painful. At the same time, he noticed a redness of both eyes and stated that the lids were swollen and stuck together in the mornings and that there was a whitish discharge from his eyes.

Repeated examinations revealed the urine to be alkaline, with a specific gravity of from 1.005 to 1.015, a faint trace of albumin, innumerable leucocytes, and a moderate number of erythrocytes. No casts were found in any examination. Urine cultures were sterile, and smears were negative for any organism. Other laboratory data were essentially negative.

On cystoscopy, the bladder urine was found to be grossly hemorrhagic and purulent. The bladder mucosa was intensely inflamed throughout but no active bleeding point was found. The ureteral orifices were normally located and of normal appearance.

While hospitalized, the patient was given adequate doses of sulfadiazine and penicillin without apparent benefit. Sodium salicylate did not relieve the joint symptoms. Sedatives and narcotics controlled the pain. Diathermy helped relieve the joint pain.

Following discharge from the hospital, the patient promptly had severe burning and pain on urination and had a recurrence of the swelling of his right ankle, which led to his second hospital admission.

In an effort to discover the etiology of this patient's disease, the question of a focus of infection was considered. It was believed that the patient had septic tonsils and their removal was advised. This was carried out, following which the patient had marked bilateral conjunctivitis, the dysuria became more marked, urethral discharge more profuse, and the right ankle more swollen, red, hot and tender. The symptoms gradually improved over a period of 2 weeks.

JOHN A. LOEF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Calcium, Phosphorus, and Phosphatase as Aids in the Diagnosis of Bone Lesions. EDMUND B. FLINK. *Radiology*, 1948, 50: 72.

Bone disease may in most instances be recognized by roentgen and clinical examinations. In certain cases, correlation of all available data, including laboratory criteria, is necessary for a correct diagnosis. A review of calcium, phosphorus, and phosphatase determinations and other procedures as they relate to the diagnosis of diseases of bone is presented.

The serum calcium is composed of two fractions: the diffusible calcium and the nondiffusible calcium; the latter, constituting about 45 per cent of the total, is bound to protein. When there is no renal insufficiency or hyperglobulinemia, 1 gm. of protein binds approximately 0.75 mgm. of calcium. Failure to recognize the protein effect may obscure actual hypercalcemia in hyperparathyroidism, or may lead to the false assumption of hypocalcemia.

The phosphatase activity of the serum is an important index of the osteoblastic activity in bone. Clinically, two phosphatases are important: the alkaline at a *p*H between 8.6 and 9.3 and the acid at a *p*H of 5.0. Hemolysis-free serum should be used for the determinations because of an erythrocyte phosphatase. Because of the large number of conditions in which the serum alkaline phosphatase is elevated, the finding must be correlated with other observations. The significance of acid phosphatase is very special and relates only to carcinomatous metastases from the prostate.

Calcium excretion in the urine and feces may lead one to the proper diagnosis. Normally about two-thirds of the calcium is excreted in the feces and one-third in the urine. This ratio changes most markedly in diseases of the parathyroid gland. In hyperparathyroidism, the urine calcium is increased; in hypocalcemic states most of the calcium is excreted in the feces.

Hyperparathyroidism is a disease which may be primary in the glands themselves or secondary to renal changes. Care must be taken in the primary type to discern whether there is a functioning adenoma or general hyperplasia of the glands. Treatment of the primary type is surgical removal of the adenoma or subtotal resection of the hyperplastic glands. Careful investigation of patients with renal calculi and with mild polyuria and polydipsia should be made. An increase in urine calcium and serum studies may reveal a previously undiagnosed case of hyperparathyroidism.

The probability of the development of tetany after removal of a parathyroid adenoma or hyperplastic glands is much greater in patients with high values for serum alkaline phosphatase than in those with normal levels.

Osteomalacia in this country has been chiefly associated with chronic mild steatorrhea. Investigation of tetany may lead to the diagnosis (confirmed by hypocalcemia and a decrease in urine calcium).

Paget's disease may be associated with acute atrophy of bone with the findings of hypercalcemia, polydipsia, polyuria, and renal disturbances. These usually occur during immobilization for treatment of fractures in cases of Paget's disease. Under ordinary circumstances, the calcium and phosphorus are normal. The phosphatase may be normal or elevated and depends on the extent of the bone involvement.

In multiple myeloma the serum calcium is often increased but the phosphorus and phosphatase are usually normal. Hyperglobulinemia occurs frequent-

TABLE I.—DIFFERENTIAL DIAGNOSTIC FEATURES OF DISEASES WITH DISTURBED CALCIUM AND PHOSPHORUS METABOLISM

Condition	Serum			Urine		Feces
	Ca	P	Phosphatase (Alkaline)	Ca	P	Ca
Hyperparathyroidism	I	D	N to I	I	I	N
Hyperthyroidism	N	N	N to I	I	I	I
Paget's disease	N	N	I	N to I	N	..
Multiple myeloma	N to I	N	N	N to I	N to I	..
Rickets	N	D to N	I	D	D	..
Osteomalacia	D to N	D	I	D	D	D
Idiopathic steatorrhea	D to N	D to N	N to I	D	D	I
Renal rickets	D to N	I	I	D	D	..
Osteogenic sarcoma	N	N	N to I	N	N	..
Metastatic carcinoma	N to I	N	N to I	I	I	..
Prostatic carcinoma	N to I	N	I	..	..	..
Neurofibromatosis	N to I	D to N	N to I	..	..	..
Uremia	D	I	N	D	D	..
Regurgitation jaundice	..	..	I	..	..	..
Hyperproteinemia	I	N	..	..	..	..
Hypoproteinemia	D	N	..	..	..	..
Acidosis	N	N	..	..	..	..
Alkalosis	N	N	..	N	N	..
Hypoparathyroidism	D	I	N	D	D	N
High vitamin D therapy	I	I	N	I	I	..

N, Normal. D, Decreased. I, Increased.

ly, as does the finding of Bence-Jones protein in the urine. There is usually an increased excretion of calcium in the urine. Bone marrow study is confirmatory.

Osteoporosis associated with hyperthyroidism and the menopause is also discussed. A negative calcium balance may persist until the condition is stabilized. Renal osteodystrophy is discussed.

The differential diagnosis of bone diseases is schematically represented in Table I.

Further discussion of the differential diagnosis and a large bibliography is included in the article.

KENATH H. SPONSEL, M.D.

Central Bone Abscesses (Les abcès centraux des os). L. TAVERNIER. *Lyon chir.*, 1947, 42: 641.

Of the 22 cases here reported with brief case histories, 11 followed osteomyelitis; 5, an old infected fracture; and 1, a polyarticular infectious pseudorheumatism. Of the remaining 5 bone abscesses, which were primary in the sense that their cause was not determined, it is quite probable that the search for the etiologic factor may have been insufficient. Therefore, a special group of cases of the so-called Brodie abscess has not been made. In fact, these abscesses are not always chronic in their course and often tend to pass over into other forms of bone infection. Nevertheless, the primary abscess shows a number of peculiarities which set it off from the other forms. Its onset is more active and its course is not so prolonged (4 to 6 months from the first attacks of pain until the period of recognition), its attacks of pain are not so violent, and its roentgenographic appearance differs from that of the secondary abscess. This abscess destroys the entire thickness of the bone with the exception of the cortex which is itself often bulged out into a fusiform swelling resembling that of a cyst or benign tumor. However, the primary bone abscess should be easily distinguished, since it is much more painful and is apt to be accompanied by fever and edema. The spina ventosa has a much less acute course. It may be more difficult to distinguish this abscess from a juxtaepiphyseal tuberculous osteitis for the distinction may finally rest upon the examination of the contents of the abscess itself.

The cases of secondary abscess may be divided into those which have developed a fistula, those which have not, those with an articular form which manifests itself as recurrent attacks of chronic arthritis until the condition is cured by the finding and removal of the original abscess in the adjacent bone, and, finally, the abscesses which are secondary to an osteomyelitis healed by penicillin. Six of these 22 abscesses were accompanied by fistula formation; all were recurrent, the periods when they were open giving complete relief to symptoms, as a rule. In several instances there were present typical findings of abscess in the bone with typical relief of pain from drainage through the fistula; yet upon operation the fistula was found to come from a secondary subperiosteal abscess while the original abscess within the bone did not connect with it. The author especially emphasizes this finding as a possible explanation of some of the diagnostic errors which have occurred in the past; it may explain how one of the patients in this series could have been operated upon 14 times without discovery of the intraosseous abscess. Another condition presenting extreme diagnostic difficulty is the postosteomyelitic painful hyperostosis; when the roentgenogram does not show the typical shadow defect of the abscess because of the presence of marked eburnation and thickening of the bony cortex, the differentiation between this condition and painful hyperostosis, or so-called hyperostosis with neuralgic, postosteomyelitic osteitis, may in the absence of operation be simply impossible. In one instance in this material the roentgen technique did not demonstrate an abscess and no abscess was found by extensive trepanation of the bone and careful search; yet the pains were not relieved by the operation and 8 days later the patient was reoperated upon, the abscess was located, and evacuation produced immediate relief.

Of course, when in the presence of a fistula the clinical or roentgenographic findings demonstrate the presence of an abscess the treatment is simple; it consists of trepanation of the bone, curettement of the contents of the abscess cavity, and reduction of the edges produced by the trepanation to flat sloping surfaces so as to leave a residual shallow depression in the bone which can easily fill in with scar tissue or regenerated bone. In this process much time has been saved by the use of penicillin; even in those cases in which the original abscess followed the failure of complete healing of an acute osteomyelitis in spite of the penicillin, the drug seems to be just as potent in hastening the healing process following opening of the abscess, and it is hoped that the drug will continue to prove capable of shortening the period of convalescence and healing of the bone following evacuation of these abscesses.

JOHN W. BRENNAN, M.D.

Malignant Degeneration of the Osteogenic Exostoses (Dégénérescence maligne des exostoses ostéogéniques). M. GUILLEMINET, M. GARNIER, DUBOST-PERRET, and A. MAKLOUF. *Lyon chir.*, 1947, 42: 710.

The authors present the case of a 27 year old woman who had suffered from congenital osteogenic disease since earliest childhood (18 months). She was covered with exostoses, and these were especially large in the popliteal spaces and on the thorax. One of the masses (in the left groin) had begun to grow rapidly; the lower extremity on that side measured 6 to 7 cm. more than that on the other side. This limb was cyanotic, edematous, and exhibited marked collateral circulatory development in the calf region and on the outer surface of the thigh. The tumor mass was removed en bloc together with the left superior ramus of the os ischii to which the mass was attached not far from the pubis. The muscles and fascia thus deprived of their attachment were pulled down and attached to the ischiopubic ramus.

Convalescence was uneventful except for an attack of phlebitis which was brought under control by lumbar infiltrations. For 5 months after the operation the patient was perfectly well.

Histologic diagnosis was of a simple enchondroma, well encapsulated, without evidence of calcification or of histologic evidence of sarcomatous degeneration.

The authors believe that the chondromas which appear on the basis of osteogenic exostoses harbor a certain degree of malignancy. However, they have been able to find not more than 13 authentic examples of this type of malignant degeneration in the literature and they therefore feel compelled to an extreme reserve in their pronouncements. Nevertheless, the rapid growth speaks for a malignant tendency and these tumors must be regarded as somber prognostic possibilities. About a third of the patients whose cases have been published obtained a lasting cure, although not all of the patients who were treated successfully died of the tumor effects. The age of the patient seems to be of prognostic value; that is, the tumor is perhaps a little less formidable in patients under 30 years of age.

Treatment consists entirely of surgical removal of the rapidly growing neoplasm. This removal is done conservatively, leaving the amputations and disarticulations for the enormous masses in those cases with local complications demanding more radical procedures. JOHN W. BRENNAN, M.D.

Cystlike Lesions of the Carpal Bones, Associated with Ununited Fractures, Aseptic Necrosis, and Traumatic Arthritis. A. K. RODHOLM and DALLAS B. PHEMISTER. *J. Bone Surg.*, 1948, 30-A: 151.

The authors report 3 cases of cystlike lesions of the carpal bones, associated with ununited fractures of the navicular bone (2 cases) and with repeated occupational trauma of the wrist and aseptic necrosis of the capitate (1 case). Bunnell describes several cases in his book and attributes the changes to disturbance of the blood supply to the affected bones.

Case histories, roentgenograms, gross and microscopic pathologic changes, and discussion are given. Attention is called to the similarity of cysts of the carpal bones to those of the capital femoral epiphysis, and their pathogenesis may be assumed to be essentially the same. The carpal cysts bear some resemblance to subcortical cystlike areas in the femoral head and in the acetabulum at the weight-bearing region in chronic degenerative arthritis.

In each case, sufficient time had elapsed for advanced revascularization and replacement of the necrotic bone. Each case showed histological evidence of aseptic necrosis in the shell of bone about the cyst. Microscopic sections are illustrated showing the principal changes of the necrotic shell of bone, degenerating articular cartilage, creeping substitution of the cortex, fibrous replacement of the central portions of the bone, necrotic spicules of bone, and partially calcified fibrous tissue.

Treatment consisted of surgical exploration of the wrists through dorsal incisions with curettage of the cyst cavities and partial ostectomies of the affected bones. The ununited fractures of the navicular were not disturbed.

Although degenerative arthritis of the radiocarpal joint was demonstrated in each case preoperatively, functional results were considered satisfactory.

KENATH H. SPONSEL, M.D.

Late Manifestations of Occult Lumbosacral Spina Bifida (Spaeterscheinungen bei Spina bifida occulta lumbo-sacralis). M. ZEHNDER. *Helvet. chir. acta*, 1947, 14: 462.

The observation of 3 patients with late manifestations of occult lumbosacral spina bifida led the author to conclude that two types of the condition can be distinguished: (1) the urologic form, characterized by a sacral incontinence of mechanical origin, and (2) the orthopedic form, which produces sensory and neurotrophic disturbances in the lower extremities. Sacral incontinence points to the location of the lesion in the intermediate nuclear zone of the upper portion of the sacral spinal cord between the anterior and posterior horns, while a lesion in the posterior horns or posterior roots is responsible for sensory and neurotrophic disturbances.

Adhesions of the spinal cord in the dorsal cleft area of the lumbosacral portion of the spinal column represent the most important pathologicoanatomic findings. The most frequent site of the incomplete fusion is the caudal invagination of the embryonal neural cord and the pars caudalis. In addition to adhesions, intraspinal occult hernias, myelocele and meningocele, resulting from the incomplete fusion, may exert pressure on the nerve tissue. Furthermore, the formation of adhesions and proliferations by the fat and connective tissue within the cleft may be responsible for pressure symptoms.

The late complications are due to the stretching of the adherent caudal portion of the spinal cord, caused by the longitudinal growth of the spinal column and the spinal canal, in contradistinction to the stationary position of the spinal cord or its normal retraction in the cranial direction.

Irreparable lesions of the nerve tissues and their clinical results can be avoided only by an early recognition of the late manifestations of spina bifida and prompt surgical intervention.

JOSEPH K. NARAT, M.D.

Ischemic Necrosis of the Anterior Crural Muscles. GEORGE S. PHALEN. *Ann. Surg.*, 1948, 127: 112.

Three cases of localized ischemic necrosis of the anterior tibial muscles are presented. Two of these were secondary to traumatic occlusion of the anterior tibial vessels; but the etiology in the third case could not be determined. Impairment of the anterior tibial vessels may be of a degree sufficient to produce gangrene of the anterior crural muscles. In the cases which are associated with fracture of the tibia or fibula, the anterior tibial vessels may have been damaged irreparably at the time of the original injury, even though the fracture may show little com-

minution or displacement and the trauma producing the fracture may have been of a minor character.

Anatomically, several factors may enhance the possibility of damage to the anterior tibial vessels in cases of trauma to the leg. The origins of the anterior and posterior tibial arteries are quite rigidly fixed by surrounding structures so that they are subject to injury not only by direct violence but also by force transmitted to the bifurcation of the popliteal artery from other parts of the leg. The anterior tibial artery passes to the front of the leg through a relatively small aperture above the upper border of the interosseous membrane. The vessel might be damaged by any trauma transmitted to this site. At this location, too, the vessel lies close to the medial side of the neck of the fibula, and might be traumatized easily by a jagged fragment of bone when the head and neck of the fibula are fractured. Finally, the thick deep fascia of the leg, the anterior intermuscular septum, the interosseous membrane, and the tibia and fibula rigidly enclose the tibialis anterior, extensor hallucis longus, extensor digitorum longus, and peroneus tertius muscles. The anterior tibial vessels and the peroneal nerve enter this compartment and may be secondarily damaged by pressure produced by swelling within this tightly enclosed space.

In one of the author's cases the correct diagnosis became obvious because of the extensive loss of skin overlying the anterior crural compartment. The diagnosis in the 2 other cases, however, was not made until the anterior crural muscles were explored surgically; in 1 instance 2 months after the onset of symptoms, and in another one month after injury, surgical intervention was undertaken. The author indicates that measures directed toward restoration or improvement of the local circulation in the lower leg might prevent, or at least reduce, the extensive gangrene of muscle tissue. Lumbar sympathetic blocks are valuable in almost any case of arterial spasm. If these are not successful, surgical exploration of the anterior tibial vessel should be considered, and either periarterial sympathectomy or arteriectomy should be done to improve the collateral circulation. Extensive fasciotomy of the anterior crural fascia may be necessary to relieve the increased pressure within the closed compartment.

The surgeon is cautioned that extreme care must be taken not to introduce any pyogenic organisms, since once such organisms have been inoculated into a bed of necrotic muscle (as was done in case 1), the infection cannot be controlled until all the necrotic tissue has been removed.

If the anterior crural muscles have been damaged irreparably, tendon transplantation may restore adequate extension to the foot and enable the patient to walk without a brace. Either the posterior tibial muscle alone, or preferably this muscle in combination with one of the peroneal muscles, may be used. Arthrodesis of the ankle joint, or even arthrodesis of the subastragular joint should not be necessary in a case of this type.

C. Fred Goeringer, M.D.

Hypermobile Flatfoot with a Short Tendo Achillis. Robert I. Harris and Thomas Beath. *J. Bone Surg.*, 1948, 30-A: 116.

The purpose of this article is to report certain recent observations regarding flatfeet, and particularly to discuss the relationship between the architecture of the tarsus in severe flatfoot and the impairment of function resulting therefrom.

During 1944 and 1945, the Royal Canadian Army Medical Corps conducted an extensive survey into army foot problems, which included the careful and detailed examination of the feet of 3,600 recruits, with subsequent re-examination. It became evident that pes planus must be divided into at least three varieties: (1) the severe and disabling type discussed in this article; (2) peroneal spastic flatfoot, also gravely incapacitating; and (3) simple depression of the longitudinal arch, which is of little consequence as a cause of disability.

Clinical manifestations of hypermobile flatfoot with a short tendo achillis include a history of deformity from childhood. Symptoms usually appear during adolescence, and disability increases with age. The feet are flat only on weight bearing. The shortness of the tendo achillis causes limitation of dorsiflexion at the ankle joint. The limitation of dorsiflexion is concealed on casual observation because of the hypermobility of the subtalar and midtarsal joints. Unless the heel is prevented from going into valgus and the forefoot from abduction, the actual limitation of dorsiflexion at the ankle joint cannot be determined. There is instability of the subtalar and midtarsal joints.

The characteristics of the deformity are described. The head of the talus is thrust downward and inward, the calcaneus is tilted into valgus, and the forepart of the foot is swung outward in relation to the hindfoot.

The incidence of this condition in 3,619 soldiers was 25 with severe deformity and 192 with mild deformity. Peroneal spastic flatfoot was diagnosed in 74 individuals and all other cases of low arch amounted to 524.

The anatomical features were studied in 200 cadavers at the University of Toronto. The conclusion was reached that weak support of the head of the talus is the cause of the deformity. Excellent illustrations are provided to demonstrate this view. Roentgenograms of the feet of 3,619 soldiers confirmed the conclusions regarding the instability of the talus on the calcaneus.

The conception that the function of the foot and its shape under the stress of weight bearing depend chiefly upon the design of the tarsal bones and their position in relation to each other is compared with the hypothesis of active support of the foot by muscle power.

A general plan of treatment is outlined. Conservative care is given in mild and severe cases until late adolescence and maturity. This consists of boot adjustments of an elevated heel, a medial border wedge on both sole and heel, the Whitman support,

and muscle exercises. Activity should be guided within the capacity of the patient. Should reduced activity and conservative measures fail in late adolescence and adulthood, surgical arthrodesis of the subtalar and midtarsal joints with the foot in corrected position should be accomplished. Lengthening of the tendo achillis is apparently not deemed necessary or desirable. KENATH H. SPONSEL, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Repair of Major Tendon Ruptures by Buried Removable Suture. HARRISON L. MCLAUGHLIN. *Am. J. Surg.*, 1947, 74: 758.

A method of internal fixation for fractured tendons, utilizing the removable traction suture principle evolved by Bunnell, was carried out in 6 lesions of the quadriceps mechanism and 8 lesions of the tendo achillis. The associated muscle components are among the strongest in the body so that marked retraction of the proximal tendon fragment is the rule and these muscle forces must be overcome and controlled before restoration and maintenance of the anatomy can be accomplished. When the lesion has been present for some weeks or months, as is not infrequently the case, extensive cicatrization of the whole local area and a relatively fixed contracture of the retracting musculature make the treatment problem still more difficult. In all cases, even after surgical repair has been accomplished successfully, the normal functional demand which ambulation places upon the major tendons of the lower extremity has made maintenance of function throughout the healing period difficult to accomplish without seriously jeopardizing the integrity of the suture line. The author stresses that tendon repair requires accurate and snug apposition of healthy to healthy tissue without tension at the repair site, with a minimum of foreign material (whether suture material, fascia, or dead tendon fibers) at the healing site and a maximum maintenance of function throughout the healing period.

The technique involved in the repair of the tendo achillis and the repair of the quadriceps mechanism is adequately described.

The wound is closed in layers over the entire fixation apparatus. Both ends of the bolt and the lead shot on the removing wire occupy a relatively subcutaneous position and remain easily palpable. Removal requires a small incision at each of these three palpable points. Local infiltration with procaine hydrochloride provides adequate anesthesia for this purpose. The terminal ends of the main suture are divided and the bolt mechanism is unscrewed and removed through the two distal incisions. The lead shot is then identified by palpation and the remainder of the apparatus withdrawn through the proximal incision by traction on the removing wire.

In the postoperative management of repair operations performed on the quadriceps mechanism the extremity is put at complete rest for from 48 to 72 hours and then placed in balanced suspension. All joints except the knee are mobilized fully. The knee is mobilized through the arc predetermined at operation.

When the operative wound has healed, ambulation with weight bearing is begun with the involved knee protected by an extension splint or brace. The internal fixation apparatus is removed 8 weeks following operation. At the same time all external protection is removed and progressive resumption of normal activities encouraged. As a result of early mobilization followed by subsequent continuous active function the penalties of restricting joint motion by the protective splint or brace are minimized and ambulation is made safe and possible throughout the period required for tendon healing. The results in 4 patients treated by a removable traction suture are tabulated.

In the discussion of this article, Sterling Bunnell described the use of various metal suture materials in such cases. Stainless steel wire for tendon sutures causes the least tissue reaction and tends not to produce adhesions. Tantalum is unfit as it is brittle and rough. After 3 or 4 weeks the suture should be withdrawn as by then the tendon has become physiologically united and any suture material is just an irritating foreign body. A word of caution was inserted concerning the use of the pull-out wire. This should not have a large loop as tissue may grow through it and hinder its withdrawal. To prevent this the loop should be closed, but not too tightly as it may break. If the suture does not withdraw, the application of a rubber band will usually lead to delivery of the wire over night.

C. FRED GOERINGER, M.D.

Excision of the Elbow-Joint. W. H. KIRKALDY-WILLIS. *Lancet*, Lond., 1948, 1: 53.

The author presented case reports on 14 Kenya patients in Nairobi of whom the elbow was resected. This procedure produced a reasonable proportion of useful joints over a 20 year period.

The indications for this operation are given by the author as follows: (1) tuberculosis, when excision of the joint removes the focus of disease and gives a full range of painless movement many months before a sound ankylosis could be produced; (2) recent comminuted fractures; (3) old unreduced fracture dislocations; and (4) osteoarthritis following injury to the joint. Postoperatively there should be no more than 10 degrees of limitation of flexion or extension, and in most of the cases there should be a full range of movement. The cases were divided into three groups on the basis of prognosis.

In recent comminuted fractures, old unreduced fractures involving the joint, fracture dislocations, and early cases of tuberculosis, recovery should be rapid and uneventful, and full movement with good lateral stability and good power of the triceps and biceps should be obtained within from 3 to 6 months after the operation. In most cases of tuberculosis re-

covery is slower because of the wasting of the triceps and biceps, and therefore a further 1 or 2 months will elapse before the power in these muscles and the lateral stability of the joint are adequate. In the second group a full range of movement is more easily and rapidly obtained than in the first. The third group includes comminuted fractures around the elbow accompanied by gross injury to another part of the body, ankylosis with wasting of the triceps and biceps, and tuberculosis with secondarily infected sinuses.

General anesthesia has been the rule, but brachial plexus block was used in one case. A pneumatic cuff tourniquet is applied to the upper arm. The arm is held by an assistant across the patient's chest, the posterior aspect thus being uppermost. The surgeon stands on the side of the patient opposite the affected elbow. A 5 inch midline posterior incision is made, centered over the tip of the olecranon, and carried down to the deep fascia. Skin towels are then applied. A nontouch technique is used throughout. An excellent detailed description of the operation is given.

The drain is removed after 2 days, and the stitches after 14 days. After 4 days the arm is flexed to 45 degrees on the adjustable splint. After a further 3 or 4 days it is extended to 45 degrees beyond the right angle, and then alternately flexed and extended at similar intervals until 3 weeks have elapsed, when the splint is exchanged for an arm sling. The chief purpose of the splint during these 3 weeks is to control lateral movement of the elbow. In about 30 per cent of these cases there was a weakness of the muscles of the forearm, especially of the extensors of the wrist and fingers, which disappeared after from 10 to 14 days; in these cases a plaster cock-up splint was applied for 2 weeks.

At the end of 3 weeks the patient is ready for rehabilitation. The arm sling is worn for 2 weeks to prevent lateral movement of the false joint. In fractures and early tuberculosis it is discarded at the end of this time; in advanced tuberculosis and when there is gross wasting of the biceps and triceps it may be required for a period of several weeks or even 2 or 3 months.

After the first month of physical therapy the patients who had fractures are instructed to saw wood each day. The tuberculous patients are given this exercise after 2 or 3 months. In the fracture cases the patients can flex and extend the elbow against resistance and control lateral movement of the joint after 3 or 4 months; they are then discharged. The fact that the patients can use the affected limb for sawing logs gives a fair estimate of its future usefulness.

In one instance a gross fibrosis of the biceps and triceps developed 5 months following the resection of the elbow. An arthrodesis of the elbow was then performed. Prior to the latter operation there was passive motion over the full range of motion. This was the least successful result in the entire series.

C. Fred Goeringer, M.D.

Epiphysiolysis of the Hip. Discussion and Results (Epifisiolisi dell'anca. Considerazioni e risultati). A. Zarattini. *Chir. org. movim.*, 1947, 31: 269.

The term "epiphysiolysis" is applied to the first stage of the condition which leads to coxa vara or valga, according to the predominating static and dynamic factors. In the majority of cases in children coxa vara results.

The author draws the following conclusions from his observations on 10 cases:

The onset of this condition is slow and offers great diagnostic difficulties in the beginning.

The relations between trauma and epiphysiolysis are obscure. Apparently, endocrine disorders play an important role in the pathogenesis of the condition, but the exact mechanism of the effect is still unknown. The intimate genesis of the osteocartilaginous dysplasia requires further investigation.

The author rejects open reconstruction of the femoral neck, using metal for osteosynthesis, although some writers advocate the method even in early stages of the disease. The surgical trauma causes a grave disturbance of the local trophic conditions and therefore the operation should be reserved only for exceptional cases. Whenever possible, arthrotomy should be avoided and subtrochanteric osteotomy done.

Bloodless reduction according to the Lorenz-Whitman method, combined with multiple perforations of the femoral neck, usually furnishes excellent results.

Joseph K. Narat, M.D.

FRACTURES AND DISLOCATIONS

Internal Contact Splint. G. W. N. Eggers. *J. Bone Surg.*, 1948, 30-A: 40.

On the basis of bone atrophy at the site of fracture, and the presence of inactive devitalized interfractural tissue, delayed or even nonunion may follow when rigid commercial bone plates are used. During a deep anesthesia, the fascial as well as the muscle components are relaxed. At the cessation of narcosis the muscular tone returns and the combined longitudinal forces induce a sustained contact during the healing phase. If a gap has been created by distraction or absorption of the fractured ends, nonunion or delayed union is inevitable. Assuming that nonunion may ensue solely from rigid bone plates, the author has introduced a new plate which permits gliding of bone if and when shortening of the bony fragments occurs. Attention is drawn to the high frequency of nonunion of the tibia when the fibula remains intact. Similarly, fracture of one bone of the forearm without the other is not infrequently associated with delayed union or nonunion. The involved mechanism is alleged to be an absorption or attrition of the fractured ends without compromise and resulting in an anatomical defect. Nonunion occurs.

Advantages of the internal contact splint are:

1. The fragment ends are easily placed together in exact approximation; the muscle pull will maintain the desired contact.

2. Oblique fixation screws across the fractured ends are eliminated. Hence, the fragment ends do not receive additional surgical trauma.

3. Impaction of the fragment ends is undesirable, unphysiological, and unnecessary; it provokes attrition.

4. Absorption of the bone fragment ends is automatically compensated for by longitudinal muscle tone.

5. Fewer screws are necessary. Hence, there is less bone trauma.

6. The internal bone splint is flat and pressure on the bone and periosteum is minimal.

7. There is less stress on the splint to break or bend at the fracture site. Dead space is eliminated by the telescoping mechanism permitted by the author's bone plate.

The article is replete with many roentgenological studies of long bone treated by this technique. Additional photographs show the method of testing, beyond reasonable doubt, the longitudinal gliding of the screws and splint.

SAMUEL L. GOVERNALE, M.D.

Operative Therapy for Slipped Upper Femoral Epiphysis. An End-Result Study. CARL E. BADGLEY, A. S. ISAACSON, J. C. WOLGAMOT, and J. W. MILLER. *J. Bone Surg.*, 1948, 30-A: 19.

In the treatment of displaced femoral epiphysis, the authors have governed their therapy of 78 hips by the following principles.

1. A displacement of not more than one-third of the diameter of the femoral epiphysis is treated by internal fixation without correction of the "preslipping" femoral head.

2. Greater displacement than in the preceding paragraph and associated with deformity and disability is dealt with by corrective operative procedures.

3. Skeletal traction for the traumatic and early slipping produces the most satisfactory results. For the maintenance of reduction, mild manipulation and internal fixation is advocated.

4. For unsuccessful skeletal traction, open reduction with a wedged osteotomy and a pin or screw fixation of the slipped epiphysis is practiced (in this group).

5. The ultimate result in cases of neglected and displaced femoral epiphysis is degenerative arthritis. Subtrochanteric or intertrochanteric osteotomy is reserved for this class of hip deformity. The authors treated 34 of the 78 hips by open reduction, removal of an anterior cuneiform wedge of bone, and fixation by means of a Smith-Petersen nail or by two screws. Eleven patients were subjected to an osteotomy at the epiphyseal site for the correction of deformity. Reduction was maintained by means of external fixation with a plaster spica. Four patients were subjected to osteotomy for alignment of the existing epiphyseal-neck derangement. Six patients were treated by closed reduction, mild manipulation, and blind nailing. Sixteen hips were fixed internally with no attempt to correct minor displacements and 4 hips were corrected by the Schanz osteotomy.

The exposure of the hip is accomplished by the anterior Smith-Petersen cup arthroplasty approach. The iliopsoas muscle is exposed, cut, and retracted medially. An excellent exposure of the anterior acetabulum is thus obtained. If possible, the labrum glenoidale should be preserved. In order to aid in the location of the osteotomy level, the anterior periosteum should be reflected, care being taken, however, not to strip or injure the posterior periosteal elements as irreparable circulatory damage may ensue. Since, in former years external fixation of similarly treated cases with a plaster of Paris spica resulted in 50 per cent of failures, internal fixation with the Smith-Petersen nail or screw is now done routinely. In the postoperative care adequate wound healing should be considered. Early ambulation is recommended, and weight bearing should be possible 3 months after operation.

The aggregate clinical results attained by the combined operative procedures mentioned were excellent in 43 patients (57%), good in 8 (11%), fair in 1 patient, and poor in 23 patients, or 31 per cent. The end-results in 38 patients treated by open reduction with internal fixation were graded as excellent in 21 (55%), good in 4 (11%), fair in 1 patient, and poor in 12 patients.

The complications encountered by the writers were those of degenerative arthritis in 18 patients (23%), aseptic necrosis in 3 (4%), nonunion of the epiphysis in 1 patient (1%) and crushing of the neck in another. The latter complication resulted from an overzealous, forceful manipulation of the deformity, a preventable complication, indeed.

In conclusion, the authors assert that open operative correction by transcervical osteotomy and internal fixation yields the best chances for a good functional hip. When a slipped femoral epiphysis with malunion existed, normal restoration of the femoral head and neck relationship by surgical means resulted in permanent good hip function in 68 per cent of the cases operated upon by the authors' method.

SAMUEL L. GOVERNALE, M.D.

Disturbance of Longitudinal Growth Associated with Prolonged Disability of the Lower Extremity. DONALD ROSS. *J. Bone Surg.*, 1948, 30-A: 103.

This article is concerned with premature closure of the growth cartilages at the knee in patients who have had prolonged dysfunction of the lower limb. It is based on the study of 13 patients, of whom 9 had tuberculosis of the hip. Each of the others had pyogenic arthritis of the hip, a slipped capital femoral epiphysis, poliomyelitis, or osteomyelitis of the shaft of the femur. Inequality of limb length resulting from growth retardation and not entailing premature closure of epiphyseal cartilage is not discussed herein.

In the cases here recorded, the site of the growth arrest at the knee varies. In 5 patients, growth arrest

occurred in both the distal femoral and proximal tibial epiphyseal plates. Premature closure of the distal femoral disc occurred centrally in all 5; but in the tibial disc, it occurred peripherally in 4, and centrally in 2. In 8 patients growth arrest of only the proximal tibial epiphyseal cartilage developed. Peripheral fusion occurred 6 times and central fusion twice. Seven of the peripheral arrests occurred in the posterior medial quadrant and 3 in the anterior quadrant of the tibial plate. The proximal fibular disc was not affected in any case, which led to relative lengthening of the fibula proximally.

The 13 case histories are presented and representative roentgenograms are reproduced. Inequalities of leg length up to 17 cm. are recorded. Photomicrographs of a prematurely uniting tibial epiphysis and its normal corresponding proximal fibular epiphyseal plate are reproduced.

Roentgenographic evidence of growth disturbance at the knee is usually present prior to the development of marked inequality of limb length or alignment deformity. The early changes are not observed unless repeated roentgenographic examinations are made from the onset of the disability to the end of the active growth period. Seven cases in this group were followed up for this length of time.

The early alterations of the epiphyseal cartilage are thinness of the epiphyseal disc and the presence of a transverse zone of dense bone on its metaphyseal aspect. Growth-retardation scars are numerous, and osteoporosis of the regional bone is pronounced. The contour of the epiphyseal cartilage is irregular with one or more peaks projecting into the metaphysis. Such changes may precede actual cessation of growth; but, in some cases, recovery of normal longitudinal growth occurs.

In the distal end of the femur, the point of arrest is commonly posterior to the central portion of the disc. The remaining disc may continue to grow, causing posterior rotation of the condyles. In the proximal end of the tibia, the arrest is often in the posterior medial quadrant, in which case continued growth of the remaining cartilage results in tibia vara. When the tibial tubercle unites prematurely, tibia recurvata occurs.

The essential pathological change is degeneration of the epiphyseal cartilage and its replacement by bone.

Prevention of growth deformity in chronic diseases of the lower extremity is not always possible. Measures to shorten the duration of disability from hip disease (such as operative fusion), avoidance of prolonged immobilization, and careful supervision of the patient who resumes weight bearing on a limb which has undergone marked osteoporosis may minimize the chance of growth arrest. Epiphyseal arrest operations, osteotomies, or leg shortening or lengthening procedures may be necessary for the best results in these cases. If asymmetrical growth arrest has occurred, alignment deformity must be prevented by producing a complete arrest of growth in that epiphysis by surgery.

Although the growth-retardation changes discussed are more pronounced at the more rapidly growing epiphyseal plate at the distal end of the femur, actual premature closure was observed more frequently in the proximal end of the tibia.

Gill had suggested that this bridge across the epiphysis forms as a result of a rupture of the epiphyseal disc when the normal support of the disc collapses with fracture of the adjacent atrophied trabeculae. An alternate explanation of the growth arrest in these cases is that the already partially degenerated cartilage is unable to withstand the abnormal stresses of a faulty gait. The cartilage wears through at the point of greatest stress and allows bony union of the epiphysis and metaphysis. In favor of this is the high incidence of growth arrest in the posterior medial quadrant of the proximal tibial plate, and the fact that growth arrest never occurred in the fibula, which is unimportant in weight bearing.

KENATH H. SPONSEL, M.D.

ORTHOPEDICS IN GENERAL

An Anatomical Study of the Mechanics, Pathology, and Healing of Fracture of the Femoral Neck. A Preliminary Report. ALADÁR FARKAS, MILTON J. WILSON, and J. CLIFFORD HAYNER. *J. Bone Surg.*, 1948, 30-A: 53.

This article is based upon gross microscopic and roentgenologic anatomical studies of numerous femurs, both fractured and unfractured. Special emphasis is placed upon the lamellar bone system within the neck of the femur. The authors undertook this study because they believed that the answer to the problem of injuries and healing of the femoral neck was dependent upon the condition of the internal weight-bearing system of the lamellar bone within the neck of the femur. They noted that abduction fractures are caused by falls or compression of the trochanteric region, whereas adduction fractures are often or usually produced by trivial trauma.

The authors have demonstrated an uninterrupted lamellar system, which they term "the internal weight-bearing system of the femur," running from below the lesser trochanter to the region of the cartilaginous plate of the femoral head. This system becomes merged with the cortex at the posterior femoral neck, and from that point proximally it tends to fan out into a diffuse weight-bearing system which ends at the cartilaginous plate of the femoral head. There is a reciprocal relationship between the strength of this structure and the cortical shell. The system is weakest where it fuses with the posterior cortex of the neck, and at this point the cortex is strongest. The system is strong where it enters the head in fanlike fashion, and at this point the cortex is thinnest. The internal weight-bearing system starts to undergo slow resorption after middle age, but it never disappears entirely. In advanced age the system is composed of laminae throughout its course. The proximal end becomes sparse. The reddish color of the distal portion of the internal

weight-bearing system seen in younger individuals becomes whitish in the aged.

This bone system is significant for three reasons:

1. It is intimately connected with weight bearing.
2. It is the chief source of bone repair.
3. Its partial resorption in old age is the main pathological factor preceding fracture of the neck of the femur.

This system has been written up by previous investigators under various names such as "calcar femorale" and "lamina femoralis interna." The proximal portion of this system has been shown to be missing in primates and quadrupeds. In pathological conditions in which the line of weight bearing changes, this lamellar system changes accordingly. The authors believe this system is a pure compression system, having nothing to do with tensile stresses, which they do not believe are important in the physiology of the hip.

This internal weight-bearing system consists of laminae "sandwiched" between layers of bone marrow, and is ideal for speedy repair after injury if it is strong and healthy and in close apposition. If the structure is pathological, healing will probably not take place.

In abduction fractures the internal weight-bearing system breaks at about the middle of the neck, but the cortex breaks at the cervicocapital juncture. Often in this type of fracture the internal weight-bearing system is not completely broken, but is "greenstick" in type, and heals rapidly even without treatment. Often there is impaction of such fractures.

The roentgenographic signs in fracture of a hip with a normal internal weight-bearing system show (1) that the laminae are numerous and densely packed, and (2) that the proximal fragment of the internal weight-bearing system is long and blunt, but not pointed.

Adduction fractures occur in the subcapital region and the separation line of the cortical fracture, and those of the internal weight-bearing system are in the same plane. When the marrow deteriorates the proximal end of the internal weight-bearing system loses its blood supply and separates pathologically. The distal ends of the system are intimately related to the cortex, and draw their nutrition from the capsule and periosteum.

There are two distinct types of fractures of the neck of the femur.

1. Compression fractures, in which the internal weight-bearing system is healthy.
2. Subcapital separations with subsequent fracture of the cortical shell. (These are always adduction fractures.)

The first type, according to these authors, may heal in from 4 to 8 weeks with good apposition and fixation. The second type requires either replacement of the internal weight-bearing system by bone grafting or its stimulation by biological, mechanical, or perhaps chemical means. Nailing or drilling seems to stimulate new bone formation. Accurate contact between the conical end of the proximal fragment and the distal portions of the lamellar system, or the graft which replaces this system, is essential. The authors use a perforated graft from the femoral shaft just distal to the trochanter. The spongy side of this is faced posteriorly, and has been successful in promoting union.

This article is accompanied by numerous photographs of anatomical specimens, which the authors prepared. Illustrative roentgenographs and photomicrographs also are furnished in support of the authors' conclusions. NEWTON C. MEAD, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Ligation and Division of the Abdominal Aorta for Metallic Embolus from the Heart. FREDERIC W. COOPER, JR., M. H. HARRIS, and J. W. KAHN. *Ann. Surg.*, 1948, 127: 1.

The authors review briefly the history of ligation of the abdominal aorta for aneurysm, first reported by Sir Astley Cooper in 1817. Thirty-six cases of partial or complete ligation of the abdominal aorta appear in the literature, and in 12 of these, successful results were obtained.

The case reported by the authors is the only one in which excision of the bifurcation of the aorta was necessitated by erosion of a portion of the wall of the aorta by a foreign body within its lumen. An uneventful clinical recovery occurred. The patient was a 22 year old male soldier who sustained a penetrating wound of the left arm and chest when he was shot with a .45 caliber pistol. Roentgenograms showed the foreign body in the heart; later it was shown to have been carried to the bifurcation of the aorta. A detailed discussion of the clinical report of the patient, together with the operative procedure, is presented.

The authors note that the conditions present in this case gave an ideal sequence leading to ligation of the aorta. The patient was young, with the vascular elasticity of youth. Occlusion of the aorta was not sudden but progressed over a period of several weeks, with variations in the completeness of obstruction to blood flow. Finally, at the time of operation, the vessel had become completely occluded, and an adequate collateral circulation had been established. Operation in this instance, actually, immediately improved the circulation in the legs as shown by the prompt rise in skin surface temperatures of the toes.

Occlusion of the vessel was accomplished with No. 00 braided silk ligatures followed by complete division of the aorta. It is believed that with ligation and division of the large vessels, ligatures of small size may be used with safety.

HERBERT F. THURSTON, M.D.

Control of Arterial Hemorrhage by a Gelatin Sponge "Cuff" and Chromic Surgical Gut Sheath: A New Experimental Method. HILGER PERRY JENKINS, EDWARD SENZ, HOWARD OWEN, and ROBERT JAMPOLIS. *Arch. Surg.*, 1947, 55: 637.

Reports on the management of vascular injuries in the recent war indicate that in only a relatively small proportion of the acute arterial injuries has it been feasible to resort to suture, anastomosis, or vein graft with the aid of vitallium tubes. The results in these cases, from the standpoint of the prevention of gangrene, have not been especially satisfactory as compared with the cases in which ligation was done.

In view of the satisfactory results which were obtained in the control of hemorrhage from wounds of the vena cava and other veins in dogs by the gelatine sponge "patch," it appeared plausible to attempt control of arterial hemorrhage with this new hemostatic agent. A technique was devised which consisted of wrapping a "cuff" of dry compressed gelatin sponge about the wound in the artery and surrounding this with a sheath of chromic surgical gut. With this method it was possible to control hemorrhage and restore blood flow in wounds of the aorta (in experimental animals) without having to resort to arterial suture.

A cuff was made of dry gelatin sponge which had been compressed with the fingers until it was pliable and could be rolled into the form of a tube. When such a cuff was used alone or held only by sutures, the gelatin sponge was rather badly fragmented and blowouts occurred. In 16 animals in which the gelatin sponge cuff was supported by a sheath of chromic surgical gut there was only one blowout from the arterial wound. In one instance, however, a large propagating thrombus was adherent to the wound in the vessel wall. Induration of the tissues was observed about the sheath in several instances.

Microscopic studies revealed healing of the wound in the wall of the vessel by scar formation which was covered by a newly formed intima. The chromic surgical gut sheath was found to be present in varying stages of absorption. The gelatin sponge was generally found to be in a more advanced stage of absorption than the surgical gut sheath.

The authors suggest that this experimental cuff technique might have some clinical application in circumstances in which a satisfactory arterial repair is not feasible by the standard suture technique. It is probable that its most potential field of usefulness would be as an added safeguard against blowout of an arterial suture line. THEODORE B. MASSELL, M.D.

Restorative Endoaneurysmorrhaphy by Vein Graft Inlay. ARTHUR H. BLAKEMORE. *Ann. Surg.*, 1947, 126: 841.

For the cure of aneurysm of the extremities the salient feature of the technique advocated by Matas is the preservation of collateral vessels through an intrasaccular approach. It is the wish of the author to present herewith a technique of vein graft inlay for the repair of degenerative arterial aneurysm with restoration of the blood flow which conserves the principle of minimal damage to the collateral vessels. The technique of the procedure is described.

While one operator is exposing the aneurysm and securing free access to the proximal and distal poles, the assistant surgeon proceeds with the removal of a segment of vein for use as a graft—preferably from another extremity. The superficial femoral vein is most commonly used. When the afferent artery is located and isolated by blunt dissection a double turn of vaselinized umbilical tape serves well

for temporary occlusion of the artery. The efferent parent artery is likewise identified and controlled. The aneurysm sac is then opened widely from pole to pole. The clot is evacuated and a search is made for openings of vessels within the sac. All vessel openings exclusive of the parent artery openings are sutured with three-zero Deknatel silk from within the sac. The distance between the parent artery openings within the sac is measured. To this measurement 4 cm. are added for the correct length of the vein graft to be used to bridge the arterial defect.

Vitallium tubes, as recommended in a nonsuture method for vein graft bridging of arterial defects, serve as a prosthesis for retention of the vein graft inlay. On account of vein valves, the proximal end of the vein graft should be joined with the distal artery opening. A series of drawings are presented to illustrate the different stages in this technique.

Four cases are presented in detail, and it is of interest to note that analysis of the 4 cases operated upon by the vein graft inlay technique revealed the restoration of a pulsating arterial blood flow with the salvage of all important collateral vessels.

The author concludes that in the light of the facts presented it is to the best interest of the patient to restore a pulsating arterial blood flow if it can be accomplished without damage to the important collateral vessels. Endoaneurysmorrhaphy with a vein graft inlay restores a pulsating arterial blood flow without damage to important collateral vessels.

HERBERT F. THURSTON, M.D.

BLOOD; TRANSFUSION

A New Technique for Replacement Transfusion in the Treatment of Hemolytic Disease of the Newborn Infant. DOUGLAS P. ARNOLD and KENNETH M. ALFORD. *J. Pediat.*, S. Louis, 1948, 32: 113.

Replacement transfusion rids the blood stream of the infant with hemolytic disease of the newborn to a considerable extent of Rh antibodies, products of hemolysis, and of red cells of the infant which are sensitized to otherwise compatible serum of the adult.

Ordinary transfusions do not accomplish this. A replacement transfusion should be done as soon after birth as is possible. Early thrombosis makes umbilical vein transfusion impossible after the first 12 hours of life.

There is no superficial vein in the infant large enough to obtain blood rapidly and in sufficient quantity. The authors describe a technique whereby the greater saphenous vein is used high in the thigh. An incision is made medially and parallel to the inguinal ligament from 1 to 1.5 cm. below a point bisecting a line joining the anterior superior iliac spine and the pubic tubercle. The vein is exposed and ligated distally. One of Diamond's plastic catheters is inserted through the exposed saphenous vein into the femoral vein or inferior vena cava. When an adequate pool of blood is encountered, 500 c.c. of blood are exchanged, 20 at a time. This effects an 80 to 85 per cent transfer. Clotting within the apparatus is prevented by means of 150 c.c. of saline solution containing 10 mgm. of heparin per cubic centimeter but this is not allowed to enter the infant's circulation. Transfusion should take from 1.5 to 2 hours. In severe anemia from 20 to 40 c.c. more blood can be injected than is withdrawn. The blood which is transfused should be slightly warmed.

Following transfusion, 10 c.c. of 5 per cent calcium gluconate are given to counteract the citrate used. The baby is kept warm and given oxygen during and after the procedure. Sulfadiazine (1 gr. per pound per day) and penicillin (3,000 units every 3 hours—intramuscularly) are then given prophylactically for 3 days. Also, 1 mgm. of vitamin K is given by hypodermic injection every 6 hours for 4 doses.

JAMES WEAVER, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

The Value of Preoperative Heart Examination. WOLFRAM KOCK. *Acta chir. scand.*, 1947, 96: 199.

In determining whether a surgical problem is one of operation or of expectance, it is sometimes a purely internomedical factor which decides the question, namely, the status of the patient's heart. It seems reasonably obvious that careful study of the anamnesis, of clinical and cardiofunctional tests, and of a consideration of the planned intervention, together with the contemplated anesthetic and after course is of great importance in estimating what the patient can stand but, to judge from reports in the literature, a decision in this delicate question is not very easily made.

After citing some of the important studies of recent years dealing with the value of preoperative heart examinations, the author gives the results obtained in a series of 406 routine, consecutive, general surgical cases in which a detailed preoperative estimate of the cardiac status was made.

These cases involved the following organs or systems: the thyroid gland (100); the thorax, pleura, lungs, breast (44); the gall ducts, pancreas, spleen (58); the stomach and duodenum (49); the intestines, rectum, and anus (59); and the kidneys and genitourinary tract (100).

Numerous tables are included which show the condition of the patients with respect to age, sex, previous cardiac history, physical and laboratory findings of cardiac aberration, electrocardiographic changes, and heart pathology as shown in roentgenograms, and each table lists the incidence of postoperative heart complications. The frequency of pathologic, electrocardiographic or roentgenographic findings in patients who, from the history and physical examination, were adduced to have a normal cardiac status is emphasized.

Insofar as anesthesia was related to postoperative complications, lumbar puncture was most frequently involved, but here analysis is difficult in that 3 complications occurred following the use of local anesthesia.

Postoperative heart complication occurred in only one case in which the preoperative estimate had been of a normal cardiac status, and in this case the issue was not fatal.

In the total series, 12 deaths occurred and these were attributed to cardiovascular causes; each case is described in detail. The author concludes that an adequate preoperative estimate of the cardiovascular condition of a patient is possible only when the complete anamnesis, physical findings, and laboratory examination, as well as the electrocardiogram and roentgenogram of the heart are all considered.

WAYNE F. CAMERON, M.D.

Discussion on Postoperative Thrombosis. HELEN PAYLING WRIGHT, MAGNUS HAINES, A. DICKSON WRIGHT, LESLIE WILLIAMS, and Others. *Proc. R. Soc. M.*, Lond., 1948, 41: 17.

WRIGHT concluded from studies on 4 patients following operation and delivery that increases in the fibrinogen B fraction and the prothrombin activity could not be used with any degree of accuracy to predict the onset of thrombosis. In 1942, she found that the platelets increased and became more adhesive following trauma incident to operation or delivery. This was most pronounced on about the tenth day. It was concluded that the increase in the stickiness resulted from the presence of the new young cells. The degree of elevation of the platelets was found to be dependent upon the amount of tissue damage and autolysis. By casting the iliofemoral segment of veins with plaster-of-Paris, a marked anteroposterior flattening was observed where the vein passes over the pelvic brim. This was attributed to the vein lying almost directly on the bone and not to constriction by the inguinal ligament. The slowing of blood flow and nipping of the clot at this point were considered as possible factors in the formation of repeated emboli. In the Fowler position the vessels were found bent almost to a right angle. Currently, studies are being carried out with radioactive isotopes on the rate of venous flow of the leg in an effort to further elucidate on the problems of stagnation in patients confined to bed.

HAINES reviewed the operations performed at the Chelsea Hospital for Women from 1927 to 1946 in order to ascertain the trend of fatal pulmonary embolism. Statistical analysis indicates that the chances were 40 to 1 that the death rate would fall in the second 10 year period as compared with the first, and the best estimate of this fall was from 4.72 per 1,000 operations to 2.22 per 1,000.

WRIGHT favored interrupting the superficial femoral veins and using anticoagulant therapy preoperatively for individuals predisposed to thrombosis. This was also recommended if pulmonary embolism occurred. The common femoral vein is interrupted above the saphenous opening in the presence of thrombosis of varicose veins or normal superficial veins. Posterior tibial phlebothrombosis is treated by superficial femoral vein ligation at the junction with the deep vein on the affected side along with the usual anticoagulant therapy. Phlegmasia alba dolens calls for novocain block of the lumbar sympathetic ganglia. For iliac thrombosis, lumbar ganglionic block and caval ligation are performed. Phlebography and thrombectomy are believed to be promising procedures.

WILLIAMS advocated anticoagulant therapy and paravertebral sympathetic block for any patient in whom venous thrombosis in the deep veins of the

leg is diagnosed. He did not, however, urge early ambulation or femoral vein interruption, to say nothing of caval ligation.

BALL reviewed 46 cases of venous thrombosis and pulmonary embolism treated with anticoagulant drugs at Central Middlesex County Hospital. He found this regimen shortened the hospital stay to about 3 weeks and the stay in bed to about 1 week. Moreover, the risk of pulmonary embolism appeared to be lessened and it seemed likely that the percentage of disabling after-effects would be markedly diminished.

GREEN-ARMYTAGE pointed out that, notwithstanding the attending trauma, embolism and thrombosis rarely follow pelvic operations from below.

DAVID H. LYNN, M.D.

Anticoagulant Treatment of Postoperative Venous Thrombosis and Pulmonary Embolism. JAMES A. EVANS and JOHN F. DEE. *N. England J. M.*, 1948, 238: 1.

Among 56,000 patients who underwent major surgical operations at the Lahey Clinic, Boston, the incidence of thromboembolic disease was 0.42 per cent (184 cases). In 33 per cent of the cases there was a warning pulmonary embolism. Not included in the 184 cases were 54 patients who died before the diagnosis had been made or treatment had been instituted. Among the group of patients who had had treatment, there were 6 fatalities. Of these, 3 may be partially regarded as therapeutic failures. Hemorrhage following dicumarol therapy developed in 12 patients, with death of one patient. Since the use of anticoagulant therapy, the mortality has been reduced to one-fourth that for the year of 1945 and to one-half that for the year of 1946 in the same institution.

Anticoagulant therapy for venous thrombosis and pulmonary embolism has superseded other methods of therapy at the Lahey Clinic. In only 10 of the 184 cases was venous ligation carried out as a complementary measure. The indications for venous ligation have been limited to the following conditions: hemorrhage, severe liver disease, ambulatory phlebothrombosis with pulmonary embolism, resistance to anticoagulant therapy of both heparin and dicumarol, recurrence of embolism after adequate therapy, and to prophylactic ligation in patients over 60 years of age. Prophylaxis against venous thrombosis consisted of early ambulation and the initiation of dicumarol on the fourth postoperative day.

The following institutional orders are applied to all patients confined in bed. Patients are instructed to exercise the toes and feet one-thousand times daily; elastic bandages are applied to the limbs of all patients with varicose veins, during their entire stay in bed; daily inspection is made to discover an unexplained fever, pain in the calf, or the presence of a positive Homan's sign; warning signs are plainly stamped on all charts containing the histories of previous venous disease; in patients receiving dicumarol therapy, determinations of the prothrombin time are made daily, in the morning, before renewal of the drug; in patients receiving both dicumarol and heparin, the coagulation time of the blood is also ascertained; excessive bleeding due to dicumarol is controlled by the intravenous administration of vitamin K—that due to heparin, by transfusion of fresh whole blood. Refractoriness was recognized by failure of the prothrombin level to fall below 65 per cent of normal during the administration of adequate doses of dicumarol. Heparin in Pitkin's menstruum was given to 55 patients and proved to be a safe and practical method of treatment.

BENJAMIN G. P. SHAFIROFF, M.D.

Pulmonary Embolism. RICHARD R. CRUTCHER and ROLLIN A. DANIEL, JR. *Surgery*, 1948, 23: 47.

The clinical and autopsy records of patients treated at the Vanderbilt University Hospital, Nashville, Tennessee, over a period of 15 years were analyzed from the standpoint of pulmonary embolism. In that time there were 83,984 admissions, 35,540 operations, 4,182 deaths, and 2,580 autopsies. Pulmonary embolism was the causative factor of death in 55 patients; 25 of these had been treated surgically and 30 had had medical treatment. One-third of the deaths occurred in individuals under 40 years of age. In the patients who were operated upon, embolism occurred within 10 days. Thrombi were located in the veins of the lower extremities in 51 per cent of the patients. Patients who succumbed to pulmonary embolism were classified into three groups: (1) those not regarded as seriously ill, (2) those seriously ill with an indeterminable outcome, and (3) those for whom a fatal outcome was expected regardless of pulmonary embolism. The greatest proportion of deaths occurred in the first group, and the smallest, in the third group.

In some cases clinical signs of phlebitis were masked by edema of the lower extremities, and were accounted for on the basis of cardiorenal disease or malnutrition. At autopsy, venous thrombi were located either in the extremities or in the lungs. Although 10 patients had shown evidence of attacks of pulmonary infarction, clinical signs of phlebitis were demonstrable in 3. Pulmonary infarcts were found at autopsy in 26 of the 55 patients and of these, 16 died of a single embolus. All of the patients in group 1 died of massive emboli involving the large pulmonary arteries. In 49 per cent of the patients, thrombi involving pelvic and abdominal veins were located cephalad of the superficial vein.

BENJAMIN G. P. SHAFIROFF, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

A Study of Burns and Scalds in Children. BRENDA MORRISON. *Arch. Dis. Childh.*, Lond., 1947, 22: 129.

Between June, 1943 and March, 1946, 31 burns and scalds in children were studied. The lesions are classified according to Dupuytren's seven degrees and the author finds a significant relationship be-

tween the degree of the lesion and the constitutional disturbances. It is emphasized that the appearance of any burn or scald within a few hours of the injury is deceptively favorable. It is not until about the tenth day that the area of dead tissue is well defined, and then it is often greatly in excess of what at first seemed likely.

During the first few days the clinical features of these injured children were carefully noted and reported. The observations of the blood pressure readings could not be considered reliable except in the quiet cooperative child. The blood examination provided data for estimating fluid lost from the circulation. The red cell counts were unreliable and soon discarded. The hemoglobin seemed reliable when done under uniform conditions, but the prevalence of a hypochromic anemia among the children made it difficult to assess the values obtained. The hematocrit value tends to be more constant and gives a quick accurate result in a ward laboratory. Thus the hematocrit proved to be the most valuable single criterion of plasma loss and, in the later cases, was used exclusively for calculations. Values for normal blood and plasma volumes were used with the hematocrit readings for the estimation of plasma loss, as follows:

Case 30—C. R., aged 2 years: normal hematocrit for age, 35 per cent; normal blood volume for age, 750 c.c.; normal plasma volume for age, 490 c.c.; abnormal hematocrit (2½ hrs. after scalding), 50 per cent. Let abnormal blood volume = x c.c; then (if total red cell volume, R, is constant)

$\frac{35 \times 750}{100} = R = \frac{50 \times X}{100}$. Therefore $x = \frac{35 \times 750}{50} = 525$ c.c.

The amount of plasma lost over 2½ hours, 750–525 = 225 c.c., or $\frac{225 \times 100}{490} = 45$ per cent of total plasma volume.

Despite all possible drawbacks of such a calculation, as hemolyses or dilution, the treatment based on the formula was more satisfactory than when guided solely by clinical criteria.

The clinical picture may be divided into three successive phases: first, fluid loss or concentration of blood; second, "toxemia"; third, secondary infection and wasting.

The phase of fluid loss and hemoconcentration was studied in detail. Steady fluid loss persisted for about 24 hours and a smaller loss for a further 12 to 24 hours, but the rate and duration of the loss seemed to vary considerably in different cases, other factors being equal. A composite picture of the usual and fairly constant physical signs and symptoms of progressive reduction in plasma volume and resulting hemoconcentration was obtained and divided into eight stages of fairly constant order of appearance. These are as follows: (1) rising pulse rate; (2) thirst; (3) coolness of the nose and extremities and mild restlessness; (4) pallor, coldness, and cyanosis of the extremities with narrowing pulse, commencing drowsiness, and vomiting; (5) marked restlessness with mental confusion and falling blood pressure; (6) air hunger; (7) loss of consciousness; and (8) complete circulatory failure and death.

Death may occur within an hour of the onset of marked restlessness and mental confusion. In small children convulsions may appear at about stage 5 or 6.

The pulse rate appeared to be of little value in assessing the severity of the injury during the first 48 hours and the rate was affected by plasma reactions, temperature variations, and restlessness, as well as by changes in blood concentration.

Cyanosis and pallor, and coldness of the skin are indicative of peripheral vasoconstriction, and their appearance and persistence are important. In the author's series, their absence did not necessarily mean that all was well but their appearance corresponded to a loss of 30 to 50 per cent of the total plasma volume.

The blood pressure readings were of some help in guiding treatment, but to wait for a marked fall in blood pressure before commencing intravenous therapy is to take unnecessary risks. Hypotension is always a significant, but usually a late, sign. Hypertension was most common, and in the majority of cases it appeared only after the administration of plasma had begun.

The mental state followed a very characteristic pattern. During the first few hours after burning the children showed a striking composure; they were alert, quiet, and appeared to have little or no pain. They usually had no complaints but asked repeatedly for drinks. As the picture advanced they often shivered and complained of the cold and asked incessantly for drinks. If they vomited they appeared unconcerned and asked immediately for another drink. At about this stage they tended to become drowsy; they slept lightly and were readily disturbed. Restlessness then appeared and was characterized by sudden movements of the limbs, shouting, and so forth. The spasms passed off as suddenly as they came on and the child was asleep in a few seconds. Drowsiness and mental confusion were noted at this time. Restlessness of this type was a manifestation of reduced plasma volume and striking relief followed efficient intravenous therapy. It is a danger signal and must never be disregarded. Sedatives, notably morphine, given at this stage may mask the gravity of the situation. Sedatives are rarely necessary once the fluid loss has been relieved.

Comparison of the hematocrit levels with the clinical findings showed that the hematocrit was a more sensitive index of fluid loss and was considerably raised before clinical illness was obvious. There was a fairly close correlation between severity of the clinical illness and the amount of fluid loss. Stages 1, 2, and 3 corresponded with up to 30 per cent plasma loss. Stages 4 and 5 corresponded with up to 30 to 50 per cent plasma loss. Stage 8 corresponded in one case with 69 per cent plasma loss.

Before stage 4 is reached the signs are not obvious to the inexperienced eye and have always to be looked for. This would indicate that the clinical signs are

a rather late manifestation of a progressive state and that the only safe estimate of the seriousness of the fluid loss is obtained by direct blood examination. Three case histories illustrated these interesting observations.

The phase of "toxemia" is less well defined and established, and is made up of a group of signs which were related in time and frequency of occurrence. They were first seen toward the end of the first 24 hours and lasted for varying periods of time up to 8 weeks. They did not seem to be attributable to either fluid loss or to secondary infection and their rapid appearance and slow disappearance suggested the action of some "toxin." The signs were not observed in all cases.

1. Sustained pyrexia and increased rate of depth of respiration were usually associated. The pyrexia differed from that of a secondary infection by the absence of irregular fluctuations and by its much earlier onset.

2. Hypertension during plasma administration was seen in 22 out of 27 cases in which readings were obtained. Its occurrence was directly associated with the depth of the burn but it was most marked where there was much sloughing.

3. Drowsiness and signs of increased intracranial pressure were present in 6 cases. All of these children had severe, deep burns and showed sustained pyrexia and hypertension.

The onset of cerebral signs with loss of consciousness occurred fairly suddenly between 19 and 33 hours but was preceded by drowsiness. Periods of apparent coma alternated with lucid intervals or restless delirium.

Cerebral edema was usually considered to be the probable explanation of these phenomena. Lumbar punctures were not conclusive, however, and at the time of onset of the nervous symptoms all of the patients showed a hematocrit value above normal. The duration of the nervous signs was usually only 2 to 3 days. Seven cases illustrating the nervous phenomena are given.

The phase of secondary anemia and wasting was of importance only in lesions covering over 20 per cent of the body surface. In this series bacterial infection appeared about the end of the second or third week.

The wasting was rapidly progressive in the severe cases and tended to become stabilized after 4 or 5 weeks but showed no improvement until healing was well advanced. Some of the wasting can be attributed to aversion to solid food and a reduced caloric intake. Loss of appetite at any time was an ill omen. It was noted that appetite was often strikingly improved overnight by correction of the anemia with blood transfusion.

Anemia of a progressive character was seen in all severe cases even when obvious secondary infection was not present. The anemia was routinely corrected with blood transfusions. The most noticeable effect of anemia appeared to be a lowering of morale. These patients exhibit a profound emotional upset which accompanies the physical illness, and constant care is required to insure recovery.

Postmortem findings of 7 fatal cases are briefly reviewed.

Treatment of the local wound was delayed until relief and control of the fluid loss had been attained. The local therapy was that of careful cleansing, tulle gras or vaseline gauze and bandage, with special care to bandage in such a manner as to completely seal off the lesion from the exterior. Dressings were repeated at 5 day intervals under general anesthesia. Skin grafting was commenced as soon as clean granulations appeared, usually after 6 or 7 weeks.

The avoidance of a certain amount of secondary infection in some cases appears practically impossible. In the treatment of severe wasting, the problem of feeding remains a difficult and all important one. To work out a satisfactory high protein diet, however, and to persuade the child to take it were two quite separate problems. The interdependence of appetite, morale, anemia, and secondary infection is very complex and of great importance.

As regards the treatment in the phase of fluid loss and concentration of the blood, it is essential that there be early recognition of the developing hemoconcentration. As more experience was obtained more reliance was placed on the hematocrit, and the intravenous fluid was given with the aim of obtaining a definite value for this. In the majority of cases the actual and expected results for the amount of fluid given showed good correlation when based on the formula used. Saline solutions were found to be of little or no use in the relief of marked plasma loss, but may need to be given in addition to plasma in cases in which the urine output is low and the child is unable to drink. HARVEY S. ALLEN, M.D.

Hard Dorsal Post-Traumatic Edema of the Hand. CLARENCE A. LUCKEY and HENRY D. MOON. *Plast. Reconstr. Surg.*, 1947, 2: 563.

Hard dorsal post-traumatic edema of the hand has been observed for many years; however, pathological studies have rarely been carried out. Unless one is familiar with the affliction, the true nature may not be suspected and proper treatment may not be carried out. The rarity of the condition undoubtedly accounts for the lack of clinical recognition in some instances.

As the name implies, the edema usually comes on following trauma and is localized to the dorsum of the hand. There is no pitting; the swelling is hard, and it does not extend to the fingers or to the wrist. Early in the century individuals afflicted with this disability were suspected of malingering; however, since that time the organic basis has been recognized.

According to Iselin, hard dorsal edema was first described by Secretan in 1901. Iselin states he personally has never seen a case. Tinel and Moncany believe that a circulatory obstruction is present. They believe that there is vasoconstriction of the capillary and venous system and that transudation

occurs from the arterioles. Andre-Thomas and Kudelski suggested that the edema may be due to an inflammatory process involving the lymphatics, venous system, and other tissues.

The authors are reporting on 2 cases of hard dorsal post-traumatic edema of the hand incurred in the army and treated by excision of the mass.

The first patient, a white male, was struck on the dorsum of the right hand by the recoil of a 75 mm. gun in March, 1944. A hematoma developed on the dorsum of the hand following the injury. This was removed a short time following injury. Hard dorsal swelling of the hand ensued and motion became quite limited in spite of extensive activity of the hand. In addition, the patient had pain in the hand. X-ray therapy was given but no benefit noted. Since conservative therapy did not bring about any improvement in the condition, excision of the mass was decided upon.

The cause of the hard dorsal post-traumatic edema remains somewhat obscure. The macrophages containing hemosiderin suggest that the fibrous tissue formation may be secondary to hematoma formation in some cases. This is consistent with the clinical history in each of the authors' 2 cases. There is an individual predilection to keloid formation. The mass removed is not unlike keloid material. This individual variation to scar formation may explain to a point at least why this process takes place in some injured hands and not in others. The microscopic sections show that the scar tissue is quite mature.

On the basis of this finding and also since reasonably good results follow surgical excision, the authors believe that complete excision of the fibrous tissue mass is the treatment of choice. Skin grafting following excision of the mass may be of benefit. Since the fibrous tissue is mature, spontaneous regression is not likely. LOUIS T. BYARS, M.D.

Plastic Repair of the Extremities by Nontubulated Pedicle Skin Flaps. JOHN MARQUIS CONVERSE. *J. Bone Surg.*, 1948, 30-A: 163.

The following observations are based on 781 operations for repair of surface defects of the extremities by nontubulated pedicle skin flaps. The pedicle flap, because of its make-up of epidermis, dermis, and subcutaneous fat, provides not only a skin dressing but adds elasticity and extensibility to joint surfaces, which allows for the normal stress and strain of everyday trauma.

Pedicle flap grafts are especially indicated in the following conditions: (1) to cover a surface defect over an area of active function such as the joints of the elbow or knee; (2) to provide a vascular integument over bone so as to allow for secondary operations such as bone graft or joint resection, inhibiting ischemic necrosis, osteomyelitis and sequestration; (3) for tendon repair to supply an inner adipose surface to keep tendons free from adhesions and provide sliding pathways for their action; (4) as a cover in the repair of peripheral nerves to minimize scar formation with its concomitant effect on conductivity and pain.

Local or contiguous flaps are obtained from the vicinity of the primary defect, and are of two types: the transposed flap and the rotation flap, the latter comprising the swinging rotation and the advancement rotation types. Local flaps are applicable for the upper extremity and the ankle or foot, but are necessarily limited by the size of the defect and the character of the tissue. Distant flaps are called direct when they are immediately transferred to the recipient site and are indirect when migration is necessary before reaching the donor site. In cases in which viability is in doubt flaps are best delayed. Delayed flaps may usually be transferred after from 10 to 14 days. In the present series, 8 of 379 distant flaps were delayed. The mapping of a true defect of any extremity is best accomplished by outlining the defect on the unaffected limb and using fixed bony points for locating longitudinal and horizontal boundaries of the defect. A true defect should be distinguished from an apparent defect which is modified by scarring and contractures.

The following points should be observed in the planning of the flap: (1) the flap operation should cause little discomfort to favor complete immobilization, (2) the transfer should be as rapid as possible, and (3) the flap should be derived from a suitable donor area. The design of the flap should be prepared in such a manner as to leave an optimum angle for its attachment and maintenance of its blood supply without kinking of blood vessels. The length of the flap should not be greater than one and a half times the width. Flap operations should be temporarily delayed during the period of redness and edema of wound margins, elevation of temperature, profuse discharge, or the identification of a hemolytic streptococcus present on wound culture

For effective flap transfer, hemostasis and careful suture of the skin edges are necessary for primary union. The raw area of the donor site may be closed by a split thickness graft or sutured without tension, when possible, by undermining of the tissue. The use of a hinge flap is a valuable method of eliminating the raw area under the main flap. Flaps are generally separated on the fourteenth day, but in the covering of denuded bone, 21 days are allowed before separation. Defects of the fingers, the interdigital spaces, and the palm of the hand are repaired by cross arm flaps. Abdominal flaps are used to repair defects of the dorsum of the hand and forearm. The elbow region is best covered by a flap raised just above the iliac crest. Defects of the arm are covered by thoracobrachial flaps. Cross leg flaps are used to cover denuded bones of the leg or foot, the position of the transfer depending on the location of the site of the defect. The inner half of the sole of the foot is covered by an oblique flap raised from the posteromedial aspect of the opposite leg. Failures in flap transfers are due to necrosis, infection, or improper postoperative care.

BENJAMIN G. P. SHAFIROFF, M.D.

ANESTHESIA

Anesthesia with Intravenous Pentothal Sodium and Local Nerve Block in Gynecologic Surgery. JAMES C. MCCANN. *N. England J. M.*, 1947, 237: 931.

Intravenous drop of pentothal sodium in a 1 per cent solution combined with local nerve block with 1 per cent procaine was given in 60 to 70 per cent of 2,000 general surgical procedures, and quantitative and pneumographic observations were made. In general it was found that the rate of administration of pentothal sodium was related to the need for the drug in the particular case, as determined by the rate of metabolic destruction of the drug, and duration of operation and its type depending on the neurologic segment in the peripheral area of distribution of the nerves in which the operation occurs. There was no evidence to indicate any so-called "cumulative action" of the drug, for, with reflex factors well controlled by procaine field block, there seems to be ample evidence of fixed level basic needs for the drug in each patient, even over an extended period. During the induction, pentothal was infused at the rate of 250 drops a minute until unconsciousness occurred. No further administration of the drug was made until the irregularities of respiration returned to normal, then quantities of 10 c.c. every minute in patients under 50 years of age, or 5 c.c. in thin, small patients over 50 years of age were given. This was repeated from 2 to 4 times until surgical anesthesia was reached. Subsequent maintenance was obtained by the administration of pentothal at the rate of 130 drops per minute whenever recurring reflex stimulation of respiration by surgical trauma manifested itself.

In vaginal operative work a method of continuous administration of pentothal and ether was used in which, after the usual induction of pentothal in 1 per cent solution, the drug was administered continuously in a 0.5 per cent solution at the rate of 30 drops a minute. Ether was administered continuously at the rate of 28 gm. an hour. Two gm. were considered the limit of pentothal, after which ether alone was given to complete the operation.

The technique of transincisional procaine block of the intercostal nerves to the lower half of the rectus muscle is described. It was carried out after complete incision of the skin, subcutaneous tissues, and fascial anterior layer of the rectus sheath occurred. With this method 87 per cent of the male patients failed to exhibit adequate abdominal relaxation; 72 per cent of the females who had a preceding pregnancy had adequate relaxation. Subsequent use of cyclopropane, ether, or curare with pentothal controlled the more powerful intra-abdominal reflexes. There was a reduction of 50 per cent in the need for pentothal as a result of peripheral blockage of all pain impulses by procaine field block, in a series of hysterectomies studied. There was an over-all mortality for the entire group of .04 of 1 per cent, and for major gynecological procedures, .07 of 1 per cent.

Pneumographic tracings demonstrate the characteristic patterns of reflex response of respiration to trauma in the three neurological fields involved by surgical trauma during pelvic surgery.

MARY KARP, M.D.

Pentobarbital Sodium-Curare Induction for Endotracheal Intubation. H. CARRON, V. K. STOELTING and S. C. CULLEN. *Anesthesiology*, 1948, 9: 11.

Curare had been used in conjunction with nitrous oxide and with pentothal to provide anesthesia and relaxation for intubation with the tracheal tube. Results of these combinations were unsatisfactory in the authors' experience.

Reported observations of a synergistic hypnotic action of pentobarbital sodium and curare suggested the use of these agents prior to intubation.

The technique used was as follows:

Preliminary medication of morphine and scopolamine was administered. Intravenous fluids were started, and a 5 to 6 per cent solution of pentobarbital sodium was administered through the infusion until the patient lost the lid reflex and did not respond to questioning. Dosage ranged from 98 to 293 mgm. with an average of 211 mgm. Oxygen was administered with a bag and mask, and fractional doses of curare were given to provide relaxation of the jaw. The average dose of curare was 107 units, the dose varying from 50 to 200 units.

Intubation did not prove difficult when this procedure was followed.

A summary of cases in which this pentothal sodium-curare technique has been used is presented.

Advantages of this technique are rapid induction of anesthesia, a lack or minimal degree of laryngospasm, ease of intubation, and rapid recovery from anesthesia.

MARY KARP, M.D.

Glycogenolysis under Prolonged Use of Sodium Seconal and Sodium Phenobarbital in Dogs. NORMAN A. DAVID, NILKANTH M. PHATAK, ROSA KUBIN, and HERMAN F. VEHRS. *Current Res. Anesth.*, 1948, 27: 25.

When barbiturates are used as preanesthetic agents, the hyperglycemia caused by such anesthetics as ether, which act principally on the cerebral cortex, is reduced. In 6 dogs which were treated for a period of several months with daily minimal anesthetic doses of sodium seconal, glucose tolerance tests performed during a 40 hour abstinence period showed a normal type of dextrose clearance curve. A second tolerance test, performed on these dogs after a 20 or 21 day barbiturate withdrawal period, showed a definite trend toward increased tolerance. The livers of these animals at autopsy were normal on gross and microscopic examination.

The mechanism of this increased carbohydrate tolerance in dogs under prolonged barbiturate treatment is neither explained nor established. This effect may be due to some changes in the endocrine balance which are normally effective in the blood glucose regulating function of the liver, or to a direct

metabolic protection of the detoxifying organ by preventing its glycogenolysis. These possibilities need further experimental exploration, which is now in progress. MARY FRANCES POE, M.D.

Endotracheal Anesthesia for Operations on Cleft Lip and Cleft Palate. M. D. LEIGH and H. A. KESTER. *Anesthesiology*, 1948, 9: 32.

Some modifications of the usual endotracheal technique are used by the authors in anesthesia on children of less than a year old. Beyond that age the technique is not materially different from that in common use (Adriani child circle filter technique).

Premedication is somewhat unusual in that morphine and scopolamine are used in patients of any age. This has been the practice of the authors in more than half of their series of cases, over a period of 7 years; however, no dosage table is included.

Induction of anesthesia is accomplished with divinyl ether, followed by diethyl ether, both given by open drop. Very early use of an oral oropharyngeal airway is advocated to prevent obstruction by the tongue's falling into the cleft in the palate.

Intubation is done in the second plane of stage 3, care being taken to flood the lungs with oxygen under the mask just before intubation. The patient's head is elevated on a padded ring, which enhances stability of the head and flexes the neck on the shoulders. The authors use their own modification of the laryngoscope, with a wide blade, narrowed anteroposterior diameter, and a bend upward of the blade at its tip. The width of the blade aids in preventing the end of the instrument from dropping into the cleft in the palate.

A soft rubber or vinyl plastic Magill tube, lubricated with water soluble nupercaine jelly, is used. Abduction of adducted cords may be obtained by blowing down a tube whose tip is placed at the glottis. The pharynx is then sucked off. The authors offer comparisons and recommendations on the sizes and lengths of tubes used. Oral endotracheal tubes are long enough to reach from the lobe of the ear to the tip of the nose, with 1 to 2 cm. to spare. No cuff is used on the tube as the cords soon accommodate to the tube and no anesthetic mixture is lost.

Maintenance is accomplished with an apparatus consisting of an "endotracheal tube, a metal connector with a bore the same size as the tube, a short piece of rubber tubing, the metal piece containing the inhalation and exhalation valve (Leigh valve), a 2 liter reservoir bag, and a rubber tube leading to the gas feed." Nitrous oxide and oxygen are supplied; if necessary, ether or cyclopropane is added for depth. The technique described was used in 54 per cent of the cases and Ayer's technique was used in 9 per cent.

Blood loss is replaced as it occurs, through a venous cut-down. Complications in induction are those of any open drop anesthetic. Endobronchial intubation is the most serious maintenance complication and accounted for one death. If rapid, deep respirations threaten to lead to collapse of the patient, double the premedication dose of morphine is given intravenously. Postoperative complications center about maintenance of the airway in an infant previously accustomed to more airway space than he now has.

Of the 493 patients whose cases are reported, 57 per cent were 2 years of age or under. Three deaths occurred, one from bronchial intubation, one from shock, and one from transfusion of incompatible blood. MARY KARP, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

The Association of Achalasia of the Cardia with Esophageal Carcinoma. P. BAER and K. SICHER. *Brit. J. Radiol.*, 1947, 20: 528.

The association of carcinoma of the esophagus with cardiospasm or achalasia is not well recognized. The authors have found in the literature 8 such cases in which the clinical data were adequately included, and 9 cases in which the clinical details were not available because of the wartime disposal of medical libraries. To these they added one case.

All of the tumors were located in the midesophagus (dilated portion), and nearly all were squamous cell carcinomas. The average age was 54.9 years, and 89 per cent of the patients were males. The average lapse of time from the onset of achalasia until the carcinoma was identified was 19.3 years, and the symptom-free interval after treatment of the achalasia was 7 years.

Because the tumor develops in the dilated esophagus, marked obstructive symptoms do not appear, even though the tumor may be quite large.

Roentgen diagnosis is difficult, not only because the elongated tortuous esophagus may be filled with food, but the demonstration of achalasia may be taken as an adequate explanation of the symptoms of the patient and the carcinoma may be overlooked. Loss of weight, which is out of proportion to the duration of the symptoms of achalasia, and the presence of blood-tinged vomitus, however, are signs which are very suggestive of carcinoma.

The authors believe that achalasia produces conditions which are favorable to the development of carcinoma. ROBERT BURNS LEWIS, M.D.

Special Roentgenographic Aspect that May Be Assumed by Primary Carcinoma of the First Part of the Duodenum (Sul particolare aspetto radiologico che possono assumere i cancri primitivi della prima porzione duodenale). DIONISIO BEDETTI. *Arch. ital. mal. app. diger.*, 1947, 13: 353.

A short discussion of the difficulty in diagnosing malignancy of the duodenum is followed by the report of a case in which the diagnosis of carcinoma of the first part of the duodenum was made roentgenologically before operation and confirmed by surgical intervention. This is of great interest because: (1) the precise location of the tumor was determined, and (2) the neoplasm was diagnosed as a primary one in the first part of the duodenum.

The case could have been easily diagnosed as a primary tumor of a contiguous organ, a polyp of the stomach or duodenum, or as a gastroduodenal invagination, but the increase in size and the rigidity of the duodenal bulb with its filiform channeling conveyed the idea that the tumor was primary in this part of the intestinal tract.

Cancer of the duodenum, because of the annular arrangement of the submucous lymphatics, assumes a circular pattern. Viewed from within the lumen, the neoplasm appears like a rigid valve, ulcerated at times. When the tumor is located near the genu superior of the duodenum it will cause an enlargement of the bulbous portion, which at times may approach a gigantic size. When the neoplasm is located near the pylorus, the stomach is the part to become dilated, the duodenal bulb appearing like a rigid canal.

The polypoid type has a tendency to ulcerate. There is, however, a malignant ulcerative type, annular in shape, which involves from one-half to three-fourths of the circumference of the viscus; it has a hard base, the edges are raised, and the growth bleeds easily. The serosal aspect of the bulb may appear normal or the bulb may be impregnated with cicatricial tissue when the ulcer is small. This type has been diagnosed as an ulcer by both the radiologist and the operating surgeon.

The roentgenographic findings are:

1. In the annular type there is a more or less serrated stenosis. When the growth is juxtapyloric there will be pyloric stenosis, and when involving the genu superior of the duodenum the bulb will be markedly dilated, and later will involve the pylorus and stomach. The diagnosis in these cases is difficult. A partial stenosis changes the duodenal bulb to an irregular, small, somewhat tortuous channel.

2. In the ulcerative type the diagnosis is difficult, the x-ray findings being very similar to those of a benign duodenal ulcer.

3. The vegetative type shows a gigantic bulb with an irregular filling defect and numerous intersecting lines of an irregular pattern. A niche, proof of its tendency to ulcerate, may be seen at times.

Dilatation of the bulb may be caused also by sarcomas. According to Stammler these may be:

1. Parietal sarcomas, pedunculated or not, and internal or external sarcomas. The internal ones may cause the same defect as that caused by a polyp. The external ones may become very large and cause compression (the myosarcoma of Salis was the size of a baby's head).

2. Intramural sarcomas, circumscribed or diffused, and unless very extensive, may be very difficult to diagnose.

The sarcomas are lymphosarcomas.

JOSEPH M. A. PAPE, M.D.

Study of the Gall Bladder in Obstructive Jaundice by Means of Diagnostic Pneumoperitoneum (Studio delle colecisti negli itteri da occlusione mediante pneumoperitoneo diagnostico). ANTONIO LURA and AXILE VIVARELLI. *Radiol. med.*, Milano, 1947, 33: 633.

Cholecystography is either contraindicated in obstructive jaundice or fails to furnish sufficient

information. In such instances pneumoperitoneum renders good services because it allows the study of the location, size, morphologic aspect of the gall bladder, and demonstrates its relations to the adjoining organs. With the application of Courvoisier's law, an occlusion of the gall bladder by a calculus can be differentiated from a malignancy.

The study can be done with the patient in one of the following 3 positions: (1) upright, (2) supine, with roentgenograms taken in the postero-anterior direction, and (3) recumbent position, with roentgenograms taken in lateral direction. Modifications of the position can be advantageously employed according to individual requirements.

A gall bladder nearly completely hidden underneath the liver cannot be easily differentiated from Riedel's lobe. Excessive weight of the patient or close apposition of the liver to the right kidney, duodenum, or the transverse colon may also interfere with the visualization of the gall bladder.

The author recommends the following positions:

1. Reverse Trendelenburg—roentgenograms to be taken in the dorsoventral direction. The degree of the optimal inclination of the table should be determined by means of a fluoroscopic examination. The patient lies on the table in supine position.

2. Left semilateral prone position—the x-rays to be directed from the right flank toward the front. This technique is especially recommended for cases in which the gall bladder is adherent to the parietal peritoneum. Pneumoperitoneum may be supplemented in selected cases by the administration of barium per os.

In 25 cases the pneumoperitoneum rendered valuable services in regard to the diagnosis.

JOSEPH K. NARAT, M.D.

Intracranial Angiography via the Vertebral Artery. STIG RADNER. *Acta radiol.*, Stockh., 1947, 28: 838.

The author describes a technique which may be used for vertebral angiography. A ureteral catheter is introduced via the radial artery. The radial artery is exposed and ligated distally in the wound, and a tourniquet is applied proximally; a small cut is then made in the vessel and the catheter is inserted. The tourniquet is removed and the catheter is gradually introduced under fluoroscopic guidance. When the catheter has entered the vertebral artery, 10 c.c. of 35 per cent diodrast solution are injected and suitable roentgenograms are taken.

Following removal of the catheter, the radial artery is ligated. No palpable difference has been noted in the radial pulse at the wrist after ligation.

Thus far, the method has been used in only a few cases.

C. R. PERRYMAN, M.D.

Roentgen Therapy in Melanoblastoma (La plesioroentgenterapia nei melanoblastomi). FRANCESCO SANTAGATI. *Radiol. med.*, Milano, 1947, 33: 337.

Thirty-eight cases of melanoma treated in the Radiology Institute of Milan were received and classified according to the method of therapy.

The first group consisted of 14 patients treated by roentgen therapy alone; of these, 9 were cured for time intervals varying from 1 to 5 years; 2 were not followed up; and 3 showed evidence of metastases in 1 to 3 years.

The second group consisted of 3 patients who were treated surgically. In this group, evidence of recurrence at the site of operation necessitated subsequent irradiation which resulted in cure in the 2 subjects in whom metastases had not developed, at an interval of 6 years.

The third group included 7 patients treated with radium only. Although the lesions in this group were, on the whole, somewhat more advanced, only 1 instance of metastases was noted. Of these, 4 were cured for time intervals varying from 14 months to more than 3 years.

In the fourth group were 14 patients treated by surgery with subsequent application of radium. Of this series 4 showed metastases. Of the 14, 6 were well at 3 years or less, while the others showed recurrence or were lost to the clinic.

The results obtained in these cases suggest that irradiation can be successfully employed in the treatment of these tumors, and that surgery should be used only when irradiation is impracticable.

EDITH B. FARNSWORTH, M.D.

RADIUM

The Treatment of Cavernous Hemangioma in Young Infants (Le traitement des angiomes tubéreux des jeunes enfants). SIMONE LABORDE. *Acta radiol.*, Stockh., 1947, 28: 723.

The author reports the results of radiation therapy in 315 young infants and children with cavernous hemangioma. Both large and small hemangiomas and portwine birthmarks were treated. The report is one of impressions rather than of statistics.

Laborde believes that the treatment may be initiated in early infancy, having started it in infants at the age of a few months. His patients were treated by radiation alone. All forms of irradiation were employed, but in general he preferred the use of either the radium element or radium emanation. In some instances removable radium seeds were employed. These were especially useful in the large cavernous types of hemangioma. The author preferred the use of minimal doses, either in flat enameled containers or needles containing 1 or 2 mgr. of radium with 0.5 mm. of platinum filtration. The beta rays are the most important.

The use of very small doses avoids most of the complications, such as actinic ulceration, disturbances of growth at the epiphyseal lines, or depressions of the flat bones; even epilation was avoided. These doses may be repeated at intervals of 3 to 4 months. It is often noted that the lesion will regress for quite a few months, and it may take even years to disappear completely.

In this series no other methods of therapy were employed. The results have been eminently satis-

factory, from both a therapeutic and cosmetic standpoint. Except for the ulcerated angiomas, which always leave a scar, esthetic results have been the rule rather than the exception. The illustrations confirm these opinions. WILLIAM C. BECK, M.D.

Some Complicating Factors in the Radium Treatment of Carcinoma of the Cervix Uteri. GILBERT I. STRACHAN. *Acta radiol.*, Stockh., 1947, 28: 545.

There are five conditions which are the main contraindications to the insertion of radium in the treatment of carcinoma of the cervix. These are: (1) advanced emaciation and cachexia; (2) extensive anemia; (3) inflammatory pelvic lesions; (4) an extreme degree of pelvic extension; and (5) fistula formation. The anemia and inflammatory pelvic lesions are temporary but should be corrected before the radium is inserted. The red blood count should not be below 3 million cells and the hemoglobin not below 40 per cent. This can be corrected by bed rest, nourishment, and blood transfusions. The present-day use of penicillin has been very effective in the treatment of inflammatory pelvic lesions. These include parametritis, peritonitis, pyometria, salpingitis, pyosalpinx, and pelvic abscess. Pyometra is particularly deceptive and difficult to diagnose. It should be cleared up before the radium is inserted. Occasionally, the emaciation and the cachexia can be improved, but if it is not, the insertion of the radium may hasten the fatal results. The author believes that an occasional case of rectovaginal fistula can be benefited by means of radium treatment, but that vesicovaginal fistulas are aggravated by it.

The cervical canal may sometimes be very difficult to find and may very often be toward the periphery of the mass. Great care must be used in probing for this canal as trauma to this region is a very important cause of pelvic inflammatory disease. Postoperative complications are relatively rare, but are often associated with poor or faulty technique. Most frequently they are observed as irritant effects to the adjacent bladder, rectum, or vagina. Packing the bladder and rectum out of the field with gauze will reduce the incidence of these complications markedly. Other important postoperative complications include pelvic infection, postoperative pyometra, fistulas (rectovaginal, vesicovaginal, or both), intestinal obstruction, and rectal and urethral stricture formations. Pyometra is most common in patients over 50 years of age. Pelvic infection was frequently associated with considerable probing to find the uterine os. The majority of the fistulas occurred in stage 3 cases. The primary mortality from the insertion of the radium was 2.6 per cent in the author's series of cases at Cardiff Royal Infirmary, England.

To evaluate the risk to the patient and to determine the presence of contraindicating factors, particularly those which are amenable to treatment, it is necessary to do a thorough examination of the patient, and this should be done by experienced and well trained specialists. S. A. PATTERSON, M.D.

The Results of the Treatment of Carcinoma of the Uterine Cervix in the Radiologic Institute of Helsinki in the Years from 1937 to 1942 (Ueber die Behandlungsersgebnisse der Kollumkarzinome im Strahlenbehandlungsinstitut zu Helsinki aus den Jahren 1937–42). V. KAHANPÄÄ and J. O. KANKKUNEN. *Acta radiol.*, Stockh., 1947, 28: 519.

The authors review the results in 524 patients with carcinoma of the cervix treated by radiation alone for over a 5 year period. Only 35 per cent of these were considered to be in a favorable stage for this type of therapy. Many patients with early conditions were subjected to operative therapy, and many patients were sent to the institute for palliative therapy because nothing else could be done for them. The former are not included in this report. The series is also not a perfect one as it was collected during the war years and some of the therapy had to be hurried or stopped because of the exigencies of war. For a time the clinic had to be completely cleared to permit repair of bomb damage.

Nevertheless, the average time of the appearance of the patient in the clinic from the time of the first abnormal bleeding was 6.2 months. The time lag between the patient's first consultation with a physician and her appearance for therapy was 1.3 months. The author blames the late visit of the patient to her physician on the indolence of the patient and her disrespect for the obvious symptoms. In 58 patients of this series (11.1%) the condition was completely hopeless and not treated, either because of the extent of the growth, the poor condition presented by the patient, or the presence of distant metastases.

The therapy usually consisted of radium so placed as to irradiate both the uterine cervix and the vagina. In patients in whom the vagina was roomy and the rectum could be packed well out of the way the vaginal doses were greatest. In some cases a lead plate was employed to protect the rectum. The average treatment consisted of 3,300 millicuries to the uterus and 4,700 millicuries to the vagina. A total irradiation dose of 8,000 millicuries was given. This was followed immediately by roentgen ray irradiation of the parametrium with 2,400 roentgen units as the depth dose; this was applied through two anterior and two posterolateral portals. The radiation was stopped if there was a marked rise in fever. The complication of a moderate proctitis with diarrhea and some blood was frequent, but rectovaginal fistula was rare.

All of the cases were studied histologically. Of the 466 patients, 167, or 35.8 per cent, were alive at the end of 5 years. The percentage of 5 year cures was in direct relationship to the clinical stage of the carcinoma; that is, 88 per cent of those with carcinoma classed as grade 1 were alive at that time, while only 6 per cent of those with carcinoma classed as grade 4 were alive. On the other hand, there did not appear to be any relationship between the histological classification and the percentage of cures.

WILLIAM C. BECK, M.D.

The Experiences with Radiotherapy in Cancer of the Cervix and of the Corpus of the Uterus at the Radium Center in Odense. P. JACOBY. *Acta radiol.*, Stockh., 1947, 28: 505.

The results of radiological treatment of cancer of the cervix and cancer of the body of the uterus at Radium Center in Odense, from 1928 to 1941, are presented and analyzed. The results obtained are grouped according to the League of Nations criteria. Three hundred and seventy-three patients with cancer of the cervix were examined, and 365 patients received treatment. Of these, 120 patients were free from evidence of the disease after a period of 5 years, with an absolute cure rate of 32.2 per cent and a relative cure rate of 32.9 per cent. All of the patients received external roentgen therapy in addition to the radium treatment.

Since 1938 the procedure has been to complete roentgen therapy before radium is applied, and it is the author's opinion that this manner of treatment has proved to be a very valuable refinement of the technique. At the same time, the responsibility for the roentgen treatment was shifted from the surgeon to the radiologist. As a result of one or both of these factors, the percentage of 5 year cures was considerably greater after 1938, particularly of lesions in stages 3 and 4. The primary mortality in the total series was 1.1 per cent. In 11 per cent of the cases, bladder and rectal reactions, such as fistula, were encountered in from 1 to 5 years following treatment, but in only 1.1 per cent of the cases were these of a permanent nature. The intensity of radium treatment was 6,000 to 7,000 mgm. hr. The average dose to the parametrium from external therapy averaged between 2,000 and 2,500 roentgens.

Cancer of the body of the uterus was divided into three categories according to Heyman's grouping, viz., (1) clinically operable lesions, (2) technically operable lesions, but bad risks because of other reasons such as obesity of the patient, old age, or associated disease, and (3) inoperable lesions. It is noted that all cases of carcinoma of the cervix, in Denmark, are referred to radiological treatment, but that there is no definite policy concerning treatment of cancer of the body of the uterus; some patients are treated surgically (if the lesion is in the operable category), while others are treated radiologically. Before 1940 the radiological treatment of cancer of the body of the uterus was nearly the same as that for carcinoma of the cervix, but since 1940 the packing treatment of Heyman has been used. The results obtained with the later treatment were definitely superior. The author notes that treatment of the operable lesions with radium gave equally as good results as treatment by surgery. The results of radiological treatment were much better in the clinically operable group than in the other two groups.

S. A. PATTERSON, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Diagnosis of the Thrombopenic Purpuras: Study of the Megakaryocytes of the Sternal Marrow; Thrombopenias of the Menopause (Diagnostic des purpuras thrombopéniques: étude des mégacaryocytes de la moelle sternale; thrombopénies de la ménopause). BERNARD DREYFUS and J. P. SOULIER. *Rev. hemat.*, 1947, 2: 305.

It is often difficult to distinguish between the idiopathic thrombopenias and those secondary to the action of chemical or physical agents. Etiologic, clinical, and hematologic data allow differentiating them, but not always, and the myelogram should be of great help.

The normal megakaryocyte rate and the physiologic equilibrium of young, adult, degenerated, and platelet-forming megakaryocytes are variably given by different investigators. Therefore, the authors have first studied eight normal myelograms. The rates ranged from 150 to 600 megakaryocytes per million nucleated cells. There was a certain parallelism between the megakaryocyte rate and the percentage of young and platelet-forming varieties of megakaryocytes. A normal slide may not contain megakaryocytes with platelets.

The megakaryocyte series presents remarkable peculiarities in idiopathic thrombopenia, of which 9 cases are considered; at least 5 cases were genodystrophic purpuras. Megakaryocyte hyperplasia is the rule; the normal number of these cells is increased three, five, and sometimes tenfold so that in some cases the diagnosis is suggested as soon as a slide is examined under low magnification. The absence of megakaryocytes with platelet formation is no less remarkable. A high percentage of young forms is usual but is not surprising in megakaryocytic hyperplasia. The number of degenerated megakaryocytes seems to be below normal. There is usually an asynchronism between a completed nuclear maturation and a young, intensely basophil cytoplasm.

The myelogram of secondary thrombopenia, of which eight slides have been studied, may present three types. The first two types cannot be confused with the picture of primary thrombopenia, whether there is a hypoplasia or aplasia with rarefaction or even disappearance of the megakaryocytes, or the appearance is that of a normal slide. The third type is rather deceptive because of the normal number of megakaryocytes and the absence of megakaryocytes with platelet formation. However, the paradoxical hyperplasia so characteristic of primary thrombopenia is usually absent. The determination of the percentage of young and degenerated forms is of little usefulness. The finding of intense megakaryocyte macrophagy is perhaps a sign of infectious purpura. Decidedly evolutive changes militate in favor of secondary thrombopenia.

The data of the myelogram alone allow a classification of the thrombopenias into those of myeloid origin (those due to a defect of elaboration and those due to a disturbance of the megakaryocyte maturation) and those of peripheral type, due to capillary accumulation or excessive splenic destruction, but without myeloid lesion. The medullary localization of the disturbance in the formation of platelets does not exclude a splenic causation.

The clinical facts suggest the possibility of dividing the idiopathic thrombopenias into the constitutional (diathesic and genodystrophic, the latter being subject to splenectomy), and the acquired, which include a rather peculiar type – the thrombopenias of the menopause, which are represented by 2 observations.

RICHARD KEMEL, M.D.

The Surgical Treatment of Pressure Sores, STUART GORDON. *Plast. Reconstr. Surg.*, 1947, 2: 557.

Efforts directed at making the paraplegic patient ambulant have brought the problem of the treatment of pressure sores to the fore. While the removal of pressure, together with good nursing, will usually result in healing, the time taken is long, and when the sores are healed, the covering is unstable. A few free grafts were tried but their use was quickly abandoned. This led to the consideration of pedicle grafting. It soon became obvious that the best type of pedicle graft was a large local rotation flap so planned that there was a minimum of scar over the pressure points.

Patients selected for operation are those in whom invasive infection is absent, whose blood urea is within normal limits, whose hemoglobin level is satisfactory, whose appetite is good, and whose serum protein level is normal. Occasionally, closure of a pressure sore must be done when conditions are not ideal. Thus, the actual blood protein level may be abnormally low, the patient steadily losing ground. In such a case successful closure of the pressure sore will abruptly stop the constant loss of protein and will, in fact, be a life-saving measure.

At first, the author attempted to operate on paraplegic patients without anesthesia, but the patients developed pallor, sweating, nausea, vomiting, lowered blood pressure, and a fast pulse. The authors have now made it a routine practice to give these patients a general anesthetic.

Fifty operations have been done on 27 patients. A large rotation flap was used to cover the raw area left after excision of the pressure sore in 46 instances, a "VY" advancement in one, a "Z" plastic shift in 2 patients, and multiple local flaps in 1 patient. Primary healing was obtained in 31 instances, slight separation in 13, and marked separation in 6. Eventually, satisfactory healing occurred in 48 patients. Free grafts to close the donor sites of flaps are rarely needed.

LOUIS T. BYARS, M.D.

A Case of Glomus Tumor with Primary Involvement of Bone. RAFFAELE LATTES and DAVID C. BULL. *Ann Surg.*, 1948, 127: 187.

The authors report a case of glomus tumor because of its unusual location. The patient was a 28 year old white woman whose chief complaint was pain in the right thumb of 4 years' duration. The thumb was enlarged with thickened and discolored skin, and vesicles on the volar surface. Roentgenograms showed honeycombed areas of decalcification in the distal phalanx. At operation, the terminal phalanx of the thumb was found to be almost completely replaced by areas of softening containing a jellylike material. The lesion was curetted, the defect filled with a bone graft, and the patient had no further symptoms. Microscopic examination revealed typical histological features of a glomus tumor, with spindle-shaped glomus cells, epithelioid elements, and smooth muscle cells.

The writers believe this is only the second case report of a glomus tumor completely encased in bone. However, many cases have been reported of glomus tumors which occurred in places other than the cutaneous-subcutaneous junction where normal glomera are usually found. These cases can be explained by assuming the existence of normal glomera sparsely distributed anywhere in the body, or by considering the glomus tumor a highly differentiated and specialized variety of hemangiopericytoma. It is probable that both the glomus cell and the pericyte represent modified smooth muscle elements from blood vessel walls, and that both descend from a common undifferentiated stem cell. It is conceivable that a neoplasm arising from such a stem cell might differentiate into a glomus tumor even in a region where glomera are not normally found.

S. LLOYD TEITELMAN, M.D.

The Changing Cancer Death Rate. EVELYN A. POTTER. *Cancer Res.*, 1947, 7: 351.

In epidemiological studies of cancer, consideration of both tumor origin and pathologic histology is essential to avoid the fallacies inherent in mixed classifications. At present, however, the cellular variations are not listed in the vital statistics reports. To secure a correct picture of changes in mortality, an adjustment of crude death rates is necessary because of the effect of a changing age composition in the population.

This presentation concerns itself with studying cancer data by the site of origin. The adjusted rate for each of the 22 sites studied was allocated to one of three classes, depending on whether the adjusted rate showed an upward trend, a downward trend, or no significant trend.

The class showing upward trends included cancers of the pancreas, testes, prostate, intestines, lung, pharynx, larynx (male), "other respiratory" organs, ovary, rectum (male), and kidney (male). This was considered, at least in part, to be due to a higher accuracy in diagnosis. Cancers of the lungs, "other respiratory" organs, and pharynx revealed the greatest increase, possibly as a result also of an increase of respiratory irritating agents.

In the class exhibiting no significant trend were cancers of the larynx (female), vulva, vagina, breast, scrotum, bladder, esophagus, kidney (female), and rectum (female). The adjusted rates for most of these sites were small, the principal exception being cancer of the breast (female). The latter, however, doubtlessly belongs with the sites having declining rates since many cases, which had metastasized, were formerly mistaken for, and classified as, primary cancer of the liver, a disease which is found to have decreased.

Cancers of the stomach, buccal cavity, skin, uterus, and liver showed an appreciable downward trend. Education and improved therapy probably played leading roles in this reduction. Better obstetrical care and the declining birth rate were also considered to be significant factors in cancer of the uterus. The relationship between childbearing and cancer of the uterus has been well established.

However, the decrease that has occurred in the mortality from gastric cancer is far greater than could be expected to result from the general educational programs and from improved medical service. The author speculates that this improvement is probably due to better dietary and living conditions.

When the cancer death rates of the white population for 1933 to 1944 in the Continental United States were adjusted to the age distribution of the total population of the United States, as enumerated in the census of 1940, the annual average increase in the rate for males was 0.76 per cent, while that for females decreased 0.38 per cent annually.

DAVID H. LYNN, M.D.

DUCTLESS GLANDS

Anatomic and Clinical Study of Spontaneous Parathyroid Tetany in the Adult. Symptomatic Importance of Radiologic Parathyroid Calcifications (Étude anatomo-clinique des tétanies parathyroïdiennes spontanées de l'adulte. Valeur séméiologique des calcifications parathyroïdiennes radiologiques). M. LEURAT and R. BRETTE. *Ann. endocr.*, Par., 1947, 8: 117.

The authors discuss 7 cases of tetany of parathyroid origin in adults. One case was of their own observation, the others were reported in the literature.

Histologic studies of parathyroid glands in cases of tetany in infants as well as in adults show that the causative lesion may be hemorrhage, tuberculosis, amyloidosis, or syphilis. Of these, hemorrhage, either minute or large, seems to be the most frequent occurrence.

The authors discuss in detail the normal and pathologic anatomy and histology of the thyroid and parathyroid glands, and stress the difficulties which sometimes arise in differentiating parathyroid tissue from a colloid vesicle of thyroid tissue or a toxic adenoma. Even experienced surgeons have mis-

taken one for the other in biopsies or in removal for therapeutic purposes. These difficulties are even greater in cases of pathology of the thyroid and parathyroid, especially in tuberculosis in which the characteristic structure of the parenchyma is more or less destroyed.

Attention is drawn to a fact which has not been described before: there are small areas of calcification in the diseased glands, mostly located at the capsule and irradiating into the thyroid tissue. These calcifications can be demonstrated with x-rays and, in certain cases, may be helpful in establishing the diagnosis.

The occurrence of spontaneous parathyroid tetany in adults seems to be extremely rare as the authors found only 6 cases reported in the entire literature since 1903. WERNER M. SOLMITZ, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

The Role of the Spleen in Relation to Cutaneous Wound Healing (Milza e potere di riparazione delle ferite cutanee). MARIO PELLOJA. *Arch. ital. chir.*, 1947, 69: 128.

The author studied the influence of splenectomy or ligature of the splenic artery on cutaneous wound healing.

Seven groups of animals were used experimentally. A dorsal cutaneous wound was made in each animal. The first group was the control group, in which only the dorsal cutaneous incision was made. It took 1 month for scar formation, and from 11 to 12 days for a 30 per cent reduction of the size of the wound to take place.

In the second group a laparotomy was performed in addition to the cutaneous wound made on the dorsum as in the control group.

Splenectomy was performed in the third group. Ligature of the splenic artery was carried out in the fourth group. In the fifth group the dorsal wound was made 15 or 20 days after the laparotomy. The dorsal wound was made 15 or 20 days after splenectomy in the sixth group, and in the last group the dorsal wound was made 15 or 20 days after the splenic artery was ligated. The following results were obtained:

In the second group the wound was reduced 9.2 mm. per day; in the third group the wound was reduced 6.8 mm. per day; in the fourth group the reduction was 6.7 mm. per day; in the fifth group it was 13 mm. per day; in the sixth group, 15 mm. per day; and in the last group the reduction was 11 mm. per day.

The experiments show that healing is retarded following intervention, in contrast to cases in which the wound was made from 15 to 20 days after the intervention, in which healing was faster than in the control animals. On the basis of these experiments, the author doubts the existence of a real specific function of the spleen to regulate cutaneous scarification: however, he attributes the changes to the general repercussion of the operative trauma.

The author has seen the greatest velocity of cicatrization from the fourth to the twelfth day, while the average velocity was 11.5 mm. daily.

ARTHUR F. CIPOLLA, M.D.

A Technique of Dissociation and Measurement of the Principal Physicochemical Factors of Blood Sedimentation (Une technique de dissociation et de mesure des principaux facteurs physicochimiques de la sédimentation sanguine). M. F. JAYLE and J. BADIN. *Rev. hémat.*, 1947, 2: 283.

The sedimentation speed of the red cells, as obtained by the method of Westergren, is the result of several variable factors, all of which do not have the same physiopathologic significance. Therefore, the authors have worked out a relatively simple method for the separate study of the three kinds of factors which condition this speed: (1) the red cell factor which includes the number of cells, their average weight and other individual factors, their tendency to reversible aggregation (Frimberger factor), and their exponential distribution conditioned by the more or less marked heterogeneity of the cell aggregations and of the cells themselves; (2) the plasma factor (fibrinogen considered from the qualitative and quantitative points of view; and (3) the serum factor, which is complex and in which must be considered the rate of certain alpha globulins of glycoproteid nature, particularly haptoglobin.

The following figures represent the averages obtained from the blood of 10 normal young women:

Hourly sedimentation speed in vertical tube..6 mm.
Number of red cells (height of sediment:
24 hours in inclined tube x 3).....4,558,000
Sedimentation speed in saline solution.....25
Factor of Frimberger.....30
Sedimentation exponential..... 15 for 6 mm.
Serum factor.....14
Plasma factor.....23

The averages obtained from the blood of 5 normal young men seemed to differ from those found in normal young women only in the number of red cells, which was 5,300,000.

The causes of error connected with the technique are the variations in temperature which seem to be particularly serious for sedimentation in the inclined tube, the variations in the number of red cells due to the use of an incorrect amount of cell mass washed in the various mixtures, the presence of air bubbles clinging to the cell aggregations, the qualitative differences between the arabic gums of different origins, the alteration occurring in the gum solution as it becomes older, the isotonicity and approximate neutrality of the saline solution, and the difficulty of certain readings because some bloods behave like heterogenous suspensions and the upper limit of their column is difficult to ascertain, although under good lighting and with some training it is nearly always possible to obtain a reading 95 per cent correct.

The authors demonstrate the clinical interest of their method by 3 examples in which the patients

presented an hourly sedimentation speed of about 60 mm. in vertical tubes and would have been considered previously as having the same physiologic disturbance. In reality, the new method shows that the acceleration of the sedimentation is due principally to hypoglobulia and secondarily to the fibrinogen in the first patient, principally to the serum factor and to fibrinogen in the second, and nearly exclusively to the fibrinogen in the third. This already suggests a differential diagnosis. In fact, the first woman had had a serious hemorrhage after delivery, the second had a beginning phlebitis, and the third woman had a normal pregnancy at term with its normal hyperfibrinemia of 5 gm.

RICHARD KEMEL, M.D.

Some Effects of Experimental Thermal Burns on Vascular Endothelium Employing a Perfusion Technique in Anesthetized Dogs. TAGUE C. CHISHOLM and ESTHER HARDENBERGH. *Ann Surg.*, 1948, 127: 75.

The authors report a method for perfusing the vascular tree of the hind leg of an anesthetized dog with a hot solution of 6 per cent gum acacia in normal saline solution in order to study the injury to the vascular endothelium. They label conventional methods for producing experimental burns as relatively crude insofar as they affect many vital structures simultaneously and unselectively.

The experimental technique is carefully described. Periods of observation following perfusion ranged from 4 to 36 hours. Foot volume lymph flow, lymph protein concentration, temperature of the animal, arterial blood pressure, pulse and respiration, blood hematocrit, photographs of the hind legs, and skin temperature on the hind feet were noted. Also selected skin biopsies, exploration of the perfused vessels and controls, and microscopic study of selected vessels were made.

Local dissection and the application of a tourniquet did not contribute to changes in vascular permeability with subsequent swelling of the extremities in the control animals. Perfused legs, however, showed edema, increase in lymph flow, and changes in lymph protein content. Anoxia attendant on perfusion apparently did not contribute significantly to these results. When the rate of flow was brisk and the period of flow not too prolonged, the incidence and magnitude of swelling was in direct relation to the temperature of the perfusate. When the perfused solution entered at 56° C., changes were meager and readily reversible, but at 75° C. the changes were severe and progressive.

Microscopic examination of skin biopsy specimens from swollen feet of animals perfused with solutions heated above 60° C. or beyond 10 minutes of perfusion time showed subcutaneous edema, congested capillaries, dilated lymphatics, and extravasation of the red cells into the intercellular spaces. The endothelial coat of veins from such legs showed a disruption of the geometric endothelial pattern with fragmentation and disappearance of the lining cells.

Under these experimental conditions, there was no evidence of the existence of immediate shock, nor was any answer found to the question whether hemoconcentration results from release of toxic substances or a shift in body fluids. Neither bacteria nor their toxins contributed to the findings, although no animal was studied longer than 36 hours.

Experimental data indicated that the duration and rate of flow of the perfusion play a role in altering the permeability of the vascular endothelium as judged by the incidence of leg swelling, rate of lymph flow, and alterations of lymph constituents.

S. LLOYD TEITELMAN, M.D.

EXPERIMENTAL SURGERY

Experimental and Clinical Studies of Reduced Temperatures in Injury and Repair in Man. Structure and Potentialities of Human Skin in Temperature Control and in Defense against Thermal Trauma. HAMILTON BAXTER and MARTIN A. ENTIN. *Plast. Reconstr. Surg.*, 1947, 2: 569.

The understanding of the reaction of human tissues to reduced temperatures of various degrees of severity is becoming more urgent in recent years. Modern warfare subjects large numbers of individuals to the influence of either prolonged moderate cold, as in immersion foot suffered by shipwrecked mariners, trench foot prevailing among the infantry personnel, or to the action of severe cold as in high altitude flying. The casualties due to cold have been particularly large in the American, German, and Russian armies of World War II.

Studies of the limit of endurance of army personnel under the influence of low temperatures are in progress in northern territories. Elective refrigeration has had many advocates for the purpose of anesthesia and as a means of treatment of gangrene and other vascular disorders. Moreover, being a "thermal injury," understanding of the pathogenesis of injury by cold and the study of the reaction of human tissue to various degrees of reduced temperature should also throw some light upon the problem of burns and other allied types of trauma.

The purpose of this investigation was to study the direct effect of a sequence of cold temperatures on the human tissues (skin grafts) free of vascular and nerve elements, and subsequent correlation of these observations with (a) the effect of cold on normal intact skin, (b) the effect of cold on healing and freshly healed surfaces, all under controlled conditions, and (c) with the findings in actual clinical cases. It was hoped that a better understanding of the pathogenesis of injury by cold, the effect of cold on wound healing, and a more effective approach to treatment would result.

Human tissues thrive best at the temperature of 98° to 99° F. (37°C.) and this is the level at which the balance of heat production and heat loss is maintained.

The existence of a special organ makes regulation of body temperature and adaptation of the human

body to variations of environment more effective. This organ is the skin.

Exposure of living tissue to different temperatures produces alterations in the rate of metabolic processes commensurate with the effect on the rate of chemical reaction and enzyme action.

It is conceivable that cold may damage the cell sufficiently to cause a disintegration of the cell membrane, yet not completely destroy the enzymes thus released. Such enzymes could act upon the distant unaffected cells by coming in contact with them when the normal temperature is restored.

When a portion of the human body is locally chilled or frozen, there results a gradation of temperatures which may range from a very low level at the surface of the skin (if carbon dioxide snow was used, for example, through the different levels of temperatures until normal body temperature is reached at some distance from the skin surface; the metabolic alteration will be proportional to the temperature at a particular level and will prevail only as long as the temperatures are maintained, but the destruction of the integrity of cells and sequelae of the physicochemical alterations of living matter may become apparent only after a lapse of time.

In view of the previously considered factors, it becomes imperative to carry out investigations and observations under conditions in which the interplay of the various factors is known or can be determined at all times, and compatible controls are constantly available. Such a set-up has not been invariably obtained, but the authors have attempted to get as near as possible to it. They chose "dermatome donor sites" (areas from which a uniform thickness of skin had been removed with the Padgett-Hood dermatome) on the thigh as the standard area. Fresh dermatome donor sites have several features which make them particularly suitable for the study of the influence of a specific factor on wound healing.

The range of the temperatures studied and the details of the methods of cooling will be incorporated in a subsequent paper.

In order to separate the different elements involved in the influence of moderate or severe cold on the tissue so that the study of the direct effect of cold could be carried on, the authors selected the free split-thickness dermatome skin graft. Free skin grafts are peculiarly suitable for such a study: (a) they are uniform in thickness: (b) they are deprived of nerve and blood supply; (c) they can be subjected to various measured temperatures for definite periods of time; and (d) they can be replaced on a suitable bed in the host where their behaviour can be studied by biopsies and other methods.

The range of temperature extended from 39° to −108° F. (4° to −78° C.) and the time of exposure varied from a few hours to several months. The details of this method will be described in subsequent reports.

Observations were carried out on the vascular response of normal intact skin to the influence of a whole range of "cold" temperatures. This was compared with the reaction of (a) recently healed donor sites where the restitution of the nervous system had not yet taken place, (b) pedicle flaps deprived of their nervous connection with the body, and (c) the recently healed and "old" skin grafts. Thus, the authors were able to interpolate the role of nervous elements in the summation of reactions to cold and freezing.

In actual clinical cases other factors must be considered which may play a contributory and even a determining part in the final outcome of the injury by cold. These include the state of peripheral circulation in the individual, the presence of specific vascular disease, the individual susceptibility to cold, the condition of the skin of the exposed part, the local factors which prevail at the time of exposure (e.g., wetness, constriction, immobilization), and many others. Some of these factors have been appraised by studying the effect of reduced temperatures on healed scars, donor sites, skin grafts, and tube pedicles under conditions in which the temperature as well as the duration of the exposure was known.

Thus, it is possible to correlate the information obtained from the experimental studies with the clinical problems, in which the condition of exposure to cold is unknown and the extent of tissue damage and prognosis are not immediately determinable.

LOUIS T. BYARS, M.D.

Control of Hemorrhage from Wounds of the Heart by the Gelatin Sponge "Patch" Technique. HILGER PERRY JENKINS, HOWARD OWEN, EDWARD SENZ, and ROBERT W. JAMPOLIS. *Ann. Surg.*, 1947, 126: 973.

The use of the gelatin sponge for hemostasis has previously been reported in cases of bleeding from wounds of the liver, kidneys, spleen, vena cava, and aorta.

In this experiment on dogs, a wound was made in the right or left ventricle with a scalpel to permit a large profuse spurt of blood with each systole. A sheet of dry compressed gelatin sponge was applied over the spurting wound and held in place by the operator's fingers with moderate pressure synchronized with the contractions of the heart while traction was made on a suture passed through the apex. Pressure was maintained over the patch for from 3 to 5 minutes for wounds of the right ventricle and from 5 to 13 minutes for wounds of the left ventricle. After this period of time the "patch" was usually sufficiently adherent to control the hemorrhage completely. After from 20 to 30 minutes the "patch" was usually firmly adherent to the heart and sometimes difficult to remove because of its "fibrin fixation" to the wound. The pericardium was sutured and the wound in the chest closed.

It was rather an important point in the technique to maintain even pressure on the patch so that when the blood clotted in the sponge, the "patch" would become adherent about the wound as a result of the liberation of fibrin during the clotting process. The

dry compressed sponge would stick to the gloved fingers very easily. Moistening the gloves with saline solution just before applying the "patch" would usually suffice to prevent this. A piece of perforated cilkloid over the "patch" will prevent the sponge from sticking to the gloves. The cilkloid should always be removed.

In a series of 15 experiments, the wound was made in the right ventricle in 4 cases and in the left ventricle in 11. The hemorrhage was completely controlled by the application of a gelatin sponge "patch" and the animal survived the immediate postoperative period. Six other animals died from ventricular fibrillation when the pericardial sac was opened or when the wound was made in the heart. The most satisfactory means of preventing fibrillation appeared to be careful handling of the heart and, especially, avoiding torsion.

In the series of 15 animals, 5 died between 2 and 12 days from distemper, pneumonia, or empyema. One died after 3 days from pneumonia but also had an intracardiac thrombosis due to the migration of the sponge "patch" into the cardiac chamber. In 2 of the animals, there was a grayish appearance of the pericardial sac suggestive of an early pericarditis although no exudate was present.

There was no evidence of blood in the pericardial sac. The closure of the pericardium appeared to be adequate additional support to the sponge to prevent subsequent blowing off of the "patch."

The gelatin sponge "patch" was firmly adherent to the heart, and usually only lightly adherent to the overlying pericardium. As a rule, the sponge appeared to undergo absorption in about 2 months. After several weeks the wound was healed by a well differentiated fibrous tissue scar.

Aside from the hemostatic effect of the sponge, it should also be pointed out that the sponge "patch" provides protective cover to the wound and gives it support during the process of wound repair.

The gelatin sponge may provide a means of obtaining immediate control of hemorrhage from a wound of the heart and at least momentarily preventing further loss of blood. It is thoroughly possible that with the hemorrhage controlled in this fashion, one could then very gently peel back the sponge and insert the suture in a relatively dry field, or the suture could be placed in the wound and tied over the patch of sponge covering the wound. In wounds adjacent to the coronary vessels the gelatin sponge "patch" alone may suffice.

GEORGE W. RICHARDSON, M.D.